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Volume II

CALCULATION OF HIGH ANGLE OF ATTACK AERODYNAMICS
OF FIGHTER CONFIGURATIONS: VOLUME II USER
MANUAL FOR VORSTAB-II

C. Edward Lan, H. Emdad, Suei Chin
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April 1991

Final Report for Period Aug 87 - Jan 90

FLIGHT DYNAMICS DIRECTORATE
WRIGHT LABORATORY
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This technical report has been reviewed and is approved for publication.

Charles B. Heath

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DesignPredictions Group

FOR THE COMMANDER

James E. Hunter

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Flight Control Division

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

A computational method for lateral-directional aerodynamics of fighter configurations is developed. The leading-edge vortices are represented by free vortex filaments which are adjusted iteratively to satisfy the force-free condition. The forebody vortex separation, both symmetrical and asymmetrical, is calculated using slender body theory. Effect of boundary layer separation on lifting surfaces is accounted for using the effective sectional angels of attack. The latter are obtained iteratively by matching the nonlinear sectional lift with the computed resulted based on lifting-surface theory. Results for several fighter configurations are employed for comparison with available data. It is shown that the present method produces reasonable results in predicting sideslip derivatives, while roll- and yaw-rate derivatives do not compare very well with forced oscillation test data at high angles of attack. Industrial usage of this has produced mixed results. At this time, the use of these methods in a production manner is not recommended.

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TABLE OF CONTENTS

INTRODUCTION

This report describes the usage of a computer program created by merging several programs and methodologies as described in references [1-4]. In the following, program capabilities, input instructions, output variables, and program job control set-up are described. Input data of sample test cases and the corresponding output are given at the end.

PROGRAM CAPABILITIES

This program has the following main features:

(1) It is applicable to nonplanar wing-body configurations in subsonic flow. For the effect of edge-separated vortex flow on longitudinal and lateral-directional aerodynamics, options for different prediction methods, including the method of suction analogy, and free vortex filaments are provided.

(2) Nine (9) lateral-directional stability derivatives can be calculated for both attached flow and vortex flow. The effect of vortex breakdown is accounted for by an empirical method [5].

(3) Up to six (6) lifting surfaces can be accepted. Some of these lifting surfaces may be subject to edge-separated vortex flow as specified by a user.

(4) Effect of leading-edge radius on edge-separated vortex flow is accounted for and is described in reference [6].

(5) Nonlinear section data may be coupled with lifting-surface solutions to provide high-alpha prediction. The methodology is described in reference [3].

INPUT INSTRUCTIONS

*** All input data are in the list-directed input format ***

Group 1

Title A descriptive phrase describing the case to be run.

** In the following, each input group should be preceded with an explanation statement for the input **

Group 2

NCASE User's specified case number which is arbitrary.

NGRD = 1 if the wings are in ground effect. In this version, this option is good only for lifting surfaces without free vortex filaments, (i.e., LEV=0 in Group 79).

= 0 if the wings are in free air.

NSUR Number of lifting surfaces, such as wing, canard, tails, etc. Limited to 6. Note: Winglets are not separate lifting surfaces.

Group 3

LAT = -1 if the rolling moment coefficient for a given aileron angle is to be computed.

= 0 for symmetrical loading only

= 1 if both symmetrical loading and lateral-directional derivatives are to be computed.

IBLC = 1, if a boundary layer correction is to be applied to roll derivatives.

= 0, no boundary layer correction is applied. Note: If airfoil data are used in the calculation, set IBLC = 0. (see NLDMM)

KT = 1, if the effect of rounded leading edges on vortex lift is calculated.

= 0, if full vortex lift effect is allowed.

IBD = 1, if the vortex breakdown effect is included in calculating vortex lift.

= 0, otherwise.

NLDMM = 1, if nonlinear airfoil section data are to be used in the calculation.

= 0, otherwise.

Groups 4 through 38 must be repeated NSUR times. Lifting surfaces with leading-edge vortex separation should be input first. (See Group 80). If there is no vortex separation, the wing is the 1st surface.

Group 4

NC Number of spanwise sections on the right wing (bounded by points of discontinuities in geometry, such as change in sweep, edges of flap segments, panels with different dihedral angles, etc.) Limited to 5 (see Sketch 1).

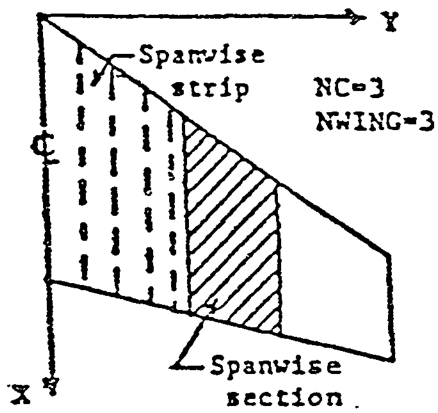
M1(I) I=1, NC Number of spanwise strips in each spanwise section. There are NC numbers. Maximum total number of strips is 48. (see Sketch 1). A minimum of 2 should be used in each section.

NWING = The numerical value of last wing spanwise section, i.e., its most outboard section.

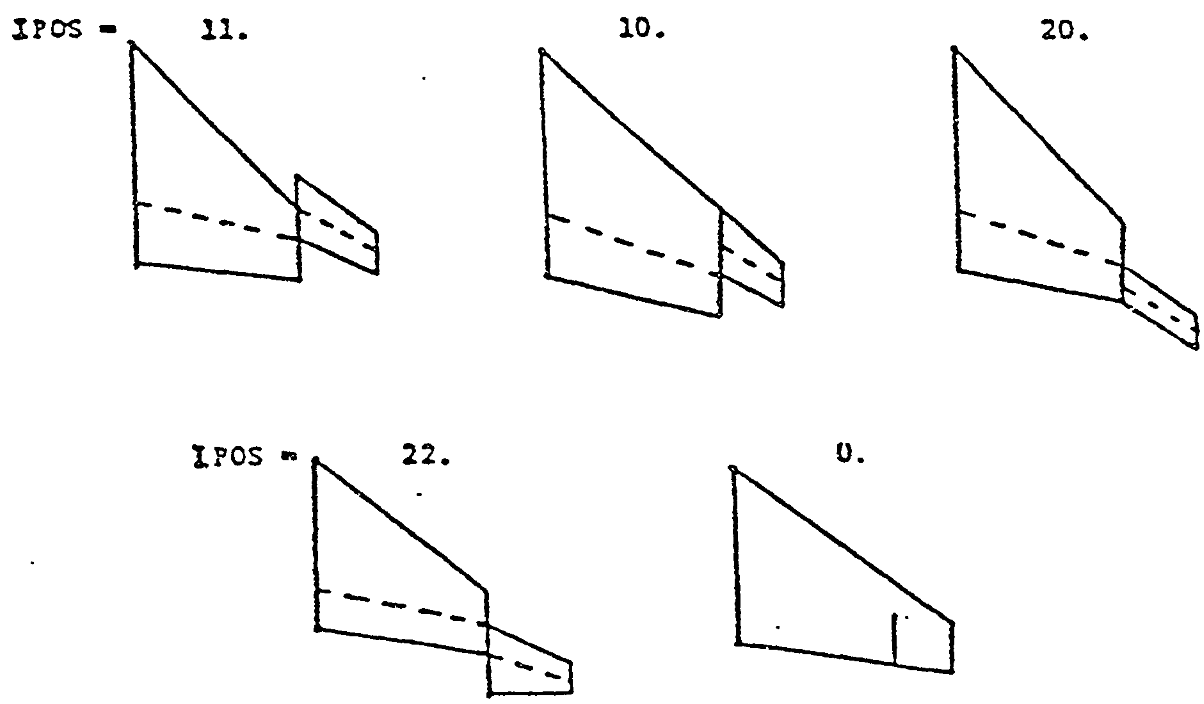
IWGLT = 1 if a winglet is present. = 2 if a vertical fin is present inboard of wing tip. = 0, otherwise.

IPOS Winglet position indicator. The number used to identify the configuration in the code is based on whether the winglet is attached to the wing first or second chordwise section, respectively, It is indicated in sketch 2. If there is no winglet, it should be 0.

Note: For coplanar lifting surfaces, such as a coplanar wing-tail configuration, spanwise sections on both upstream and downstream surfaces must line up and numbers of spanwise strips in the corresponding spanwise sections must be the same. This is to avoid trailing vortices from passing over control points on the downstream surfaces.



Sketch 1.



Sketch 2

Group 5

NFP Number of trailing-edge flap segments. Limited to 5.

NJW(I), I=1, NFP Numerical value of the spanwise section in which the trailing-edge flap segment is contained. For either clean or full-span flap configurations, set NFP=1 and NJW (1) = 1. (See Sketch 3.)

NVRTX The spanwise strip number on a lifting surface, cumulative from its center line, at which and outboard of which the leading-edge vortex lift effect is not included. Full vortex lift effect is assumed if this value is set to zero.

MVRTX The spanwise strip number on a lifting surface, cummulative from its center line, at which and inboard of which the L.E. vortex lift effect is not included.

NLEF = 1, if the flaps are flat leading-edge flaps.

= 0, if the flaps are trailing-edge flaps.

IV = 1, if the lifting surface has dihedral of 90-deg. and is situated on the plane of symmetry.

NAL = Numerical value of the aileron segment along the trailing-edge flap segments. For an all-movable surface for lateral control, NW(2) should be 0 for the surface. (See Group 7.)

Group 6

DF(I), I=1, NFP Trailing-edge flap angles in degrees, inboard trailing-edge flap segment first. For leading-edge flaps, the angles are negative for nose down. (See Note 1.)*

Group 7

NW(1) Numbers of chordwise aerodynamic panels in chordwise sections.

NW(2) (See Sketch 3). The chordwise section may be bounded along trailing edge flap hinge line or winglet leading edge. NW(2) = 0 for clean configurations. (NW(1) + NW(2)) is limited to 15. Use at least 8 for NW(1) + NW(2) for cambered sections.

---

*Notes appear at the end.

ICAM = 0 for non-cambered airfoils

= 1 if camber ordinates are to be read in

= 2 if camber slopes are defined analytically in subroutine ZCDX.

= 3 if there are flat leading-edge flaps attached to a non-cambered wing.

IST Number of y-stations at which camber ordinates are read in. Limited to 10. If ICAM = 3, IST is the number of leading-edge flap segments. If ICAM = 1, at least 2 y-stations are needed, to cover each surface, one at the root and the other at the tip.

ICAMT Numerical value of the y-station at which and beyond which the input cambers are for the winglet or vertical fin.

= 0 if there is no camber for the winglet or fin.

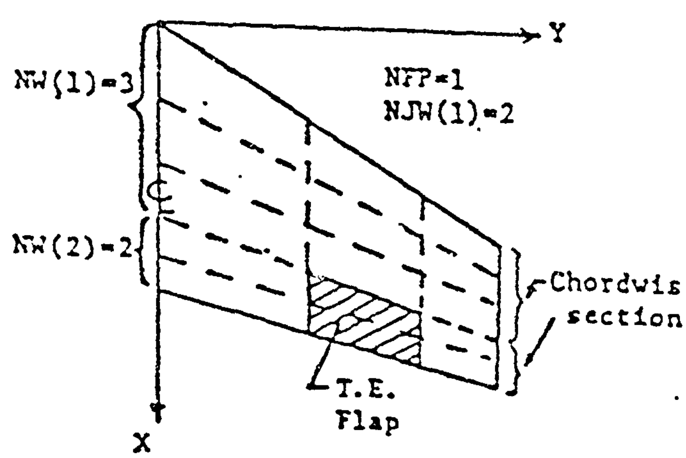
ITHCK = 1 if thickness distribution is to be input

= 0 otherwise

NST = number of spanwise stations of thickness to be input, at least 2. Limited to 10 for each lifting surface.

NDIT = 1 if the thickness distribution is dimensional

= 0 if nondimensional thickness distribution is input



Sketch 3

Omit Groups 8, 9, and 10 if ICAM $\neq$ 1. Repeat Groups 8, 9, 10 IST times.

Group 8

YT(I)	y-station (dimensional) at which camber ordinates are read in.
XNUM	number of camber ordinates to be read in. Limited to 21.
CURV(I) = 0.	if camber is to be formed by connecting straight segments, with first segment being regarded as flat leading-edge flap.
= 1	if cubic spline interpolation is used. Intervals between x/c values in Group 9 should not vary widely.
= 2	if cubic spline interpolation is used, with first segment being flat leading-edge flap.
CHND(I)	Chord length at YT(I) station.

Group 9

XT(I,J)	x/c-values at which camber ordinates are read in for YT(I) station.

Group 10

CA(J)	z/c-values of camber ordinates at the corresponding XT(I,J)-locations. (See Note 2.)

Omit Groups 11, 12, and 13 if ICAM $\neq$ 3. Repeat IST times.

Group 11 (See Note 3.)

YLEF(I,1)	Extreme inboard y-coordinate of the Ith flat leading-edge flap segment.

YLEF(I,2) Extreme outboard y-coordinate of the Ith flat leading-edge flap segment.

Group 12

XLF(I,1) First-corner point coordinates of the Ith flat leading-edge flap segment.

YLF(I,1) See Sketch 4.

ZI " " "

XLF(I,2) Second-corner point coordinates of the Ith flat leading-edge flap segment.

YLF(I,2) See Sketch 4.

Z2 " " "

Group 13

XLF(I,3) Third-corner point coordinates of the Ith flat leading-edge flap segment.

XLF(I,3) See Sketch 4.

Z3 " " "

XLF(I,4) Fourth-corner point coordinates of Ith flat leading-edge flap segment.

YLF(I,4) See Sketch 4.

Z4 " " "

If ITHCK = 0, skip Groups 14, 15, and 16.

Group 14

YH = the y-station at which thickness ordinates are to be input

XNUM = number of thickness ordinates to be input. Limited to 21

CRVT = 0, if thickness ordinates are connected by straight segments

= 1, if cubic spline interpolation is to be used

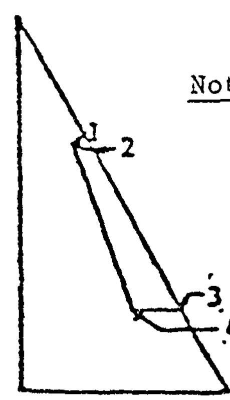
CHTD = chord length at the y-station

Group 15

XH x-coordinates, nondimensional if NDIT = 0

Group 16

CA thickness ordinates, nondimensional if NDIT = 0



Note: The flat flap must be inside the boundary of planform described in Group 18.

Sketch 4

Repeat Groups 17-21 NC times. See also the Note at the end of Group 18.

Group 17

IPN = 1 if the shapes of L.E. and T.E. are to be defined numerically.

= 0 otherwise.

Group 18

Corner-point coordinates of a spanwise section. (See sketch 5a.)

XXL(1) L. E. X-coordinate of the inboard chord.

XXT(1) T. E. X-coordinate of the inboard chord.

YL(1) Y-coordinate of the inboard chord.

XXL(2) L. E. X-coordinate of the outboard chord.

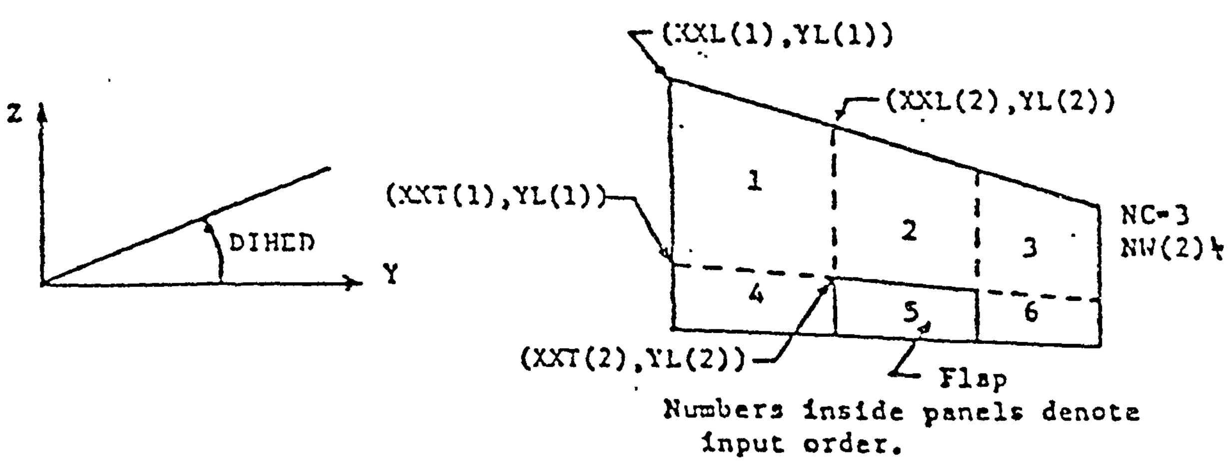
XXT(2) T. E. X-coordinate of the outboard chord.

YL(2) Y-coordinate of the outboard chord.

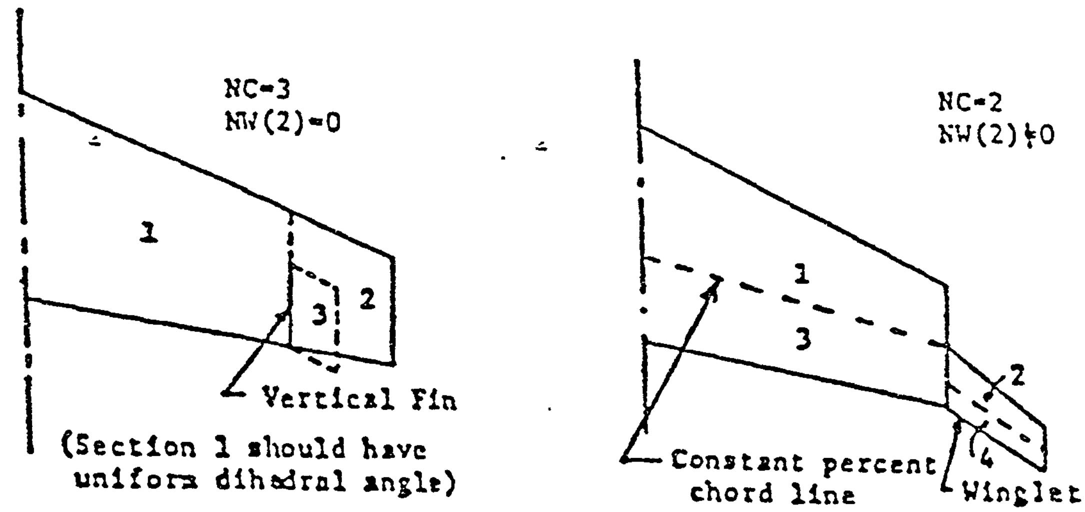
ZS elevation of root chord of the lifting surface relative to fuselage centerline.

DIHED dihedral angle in degrees for the section. For NASYM = 1, DIHED for the left wing is negative upwards.

Note: Groups 17 through 21 are to be repeated NC times. With trailing-edge flaps or winglet, another NC cards are needed to describe the flap and the associated regions. The order of input is illustrated in Sketch 5. Panels with dihedral must be rotated to a plane parallel to the X-Y plane for geometric description. It is important to line up as much as possible the vortex strips on lifting surfaces which are nearly on the same plane.



Sketch 5a



Sketch 5b

Groups 19-23 must be omitted if IPN = 0.

Group 19

NLE Number of input points to define the leading edge. Limited to 15.

NTE Number of input points to define the trailing edge. Limited to 15.

MCVL = 1 if the cubic spline is used to interpolate the L.E. shape. Intervals between the y-coordinates in Group 20 should not vary widely.

= 0 if straight segments are assumed.

MCVT = 1 if the cubic spline is used to interpolate the T.E. shape.

= 0 if straight segments are assumed.

Group 20

CA(I), I=1, NLE X-coordinates of input points to define the LE shape, measured relative to the LE of inboard chord.

Group 21

YSL(I),I=1, NLE Y-coordinates of input points to define the LE shape, measured relative to the inboard chord. (See Note 4.)

Group 22

CA(I), I=1, NTE X-coordinates of input points to define the TE shape, measured relative to the TE of inboard chord.

Group 23

YST(I), I=1,NTE Y-coordinates of input points to define the TE shape, measured relative to the inboard chord.

Omit Groups 24 and 25 if KT = 0

Group 24

ICNLE = 0 for constant L.E. radius/local chord ratio.

= 1 for constant L.E. radius.

= 2 for variable L.E. radius/chord ratio.

Group 25

RC = L.E. radius/local chord of ICNLE = 0

= L.E. radius if ICNLE = 1

= L.E. radius/local chord, if ICNLE = 2, at all spanwise control stations.

Group 26

TWST = 1. if there is geometric twist.

= 0. otherwise.

RINC = Incidence angle, in degrees, of the lifting surface.

TINP = Incidence angle, in degrees, of winglet or vertical fin, relative to the root of the lifting surface.

Groups 27 through 29 should be omitted is TWST = 0.

Group 27

YNUM Number of y-stations to be used to describe twist distribution.

TCURV = 0. if the twist distribution is assumed to have piecewise linear variation.

= 1. if cubic spline interpolation is used. Intervals between y coordinates in Group 28 should not vary widely.

Group 28

YTS(I) Nondimensional (based on semispan) y coordinates at which twist angles are defined. YNUM numbers. Limited to 21.

Group 29

CA(I) Twist angles in degrees at the corresponding y-stations. Negative for washout (i.e., leading-edge down).

Omit Groups 30-38 if NLDMM = 0. (See Group 3)

Group 30

INMM Number of points on sectional $c_\ell - \alpha$, $c_\ell - c_d$ curves to be read. Limited to 20.

NARM Number of sets of airfoil characteristics for the lifting surface to be input.

Groups 31 through 38 are repeated NARM times. If INMM = 0 they should be skipped.

Group 31

ALPO Angle of zero lift in degrees.

YIB Inboard y-station bounding the spanwise section

YOB Outboard y-station bounding the spanwise section

CLCD = 1. if the $c_\ell - c_d$ curve is used to define c_d in Group 34

= 0. f the $c_d - \alpha$ curve is used to define c_d in Group 34. This option is recommended.

PARMF a relaxation parameter. Typically, a value of 0.5 should work well.

Group 32

AW(I), I=1, INMM Angles of attack in deg.

Group 33

CA(I), I=1, INMM Sectional c_ℓ at the corresponding angles of attack in Group 32.

Group 34

AW(I), I=1, INMM Sectional c_ℓ on the $c_\ell - c_d$ curve if CLCD = 1. Angles of attack in deg. if CLCD = 0.

Group 35

CA(I), I=1, INMM Sectional c_d corresponding to c_ℓ or α in Group 34.

Group 36

XMRF Sectional pitch center location in fraction of local chord, measured from the airfoil L.E.

Group 37

AW(I), I=1, INMM Angles of attack in deg.

Group 38

CA(I), I=1, INMM Sectional c_m corresponding to α in Group 37.

REPEAT NSUR TIMES

Group 39

AM Freestream Mach number < 1.0

RN Wing Reynolds number multiplied by 10^{-6}, based on CREF.

HALFSW Half of reference wing area, same units as (CREF) squared.

CREF Reference chord length

BREF2 Reference half span

XREF x-coordinate of moment reference point.

ALPCON = 1, if C_{L_α} and C_{m_α} are to be computed. For this case, set T.E. flap angles to zero. Calculation is done at α = 1 radian. (Used only if NLDMM = 0 in Group 3, LEV=0 in Group 79 and without a fuselage.)

= 2, if the calculation is for one design lift coefficient based on the attached-flow theory,

= 3, if it is based on the vortex flow theory.

= 0, otherwise

Group 40

(Set the following variables to 0, If ALPCON = 1.)

ALNM Number of angles of attack to be processed. If ICAM $\neq$ 0 and IBD = 1, set ALNM $\geq$ 2. Limited to 15. If IBD = 1 and LEV = 1 (see Group 79) use two α's (i.e., ALNM = 2).

SNUM Number of spanwise stations involving augmented vortex lift.

DVRTX =1, if an additional discrete strake vortex is needed to calculate the augmented vortex lift effect.

= 0, otherwise

CLDS = design lift coefficient if ALPCON = 2 or 3. (Used only if LEV=0 in Group 79.)

= 0, otherwise

If ALPCON = 1., set ALPA = 0.

Group 41

ALPA(I) Angles of attack in degrees. ALNM numbers. If there are camber, leading-edge flaps, and/or rounded leading edges, start with a high value of angles (such as 35-40°). If IBD = 1 and NDLM ≠ 0 or LEV = 1, the first α is used only to determine α_{BD} and airfoil data are not used.

Repeat Group 42 SNUM times. If SNUM = 0, set all variables to zero.

Group 42

SNI Spanwise strip number, cumulative from the center line of the first lifting surface, starting from which the leading-edge vortex produces the vortex lift augmentation on a downstream surface.

= 0. if there is no vortex lift augmentation.

SNE Ending spanwise strip number for vortex lift augmentation.

= 0. if there is no vortex lift augmentation.

CTILT Characteristic length for augmented vortex lift effect. It may be positive or negative. (See Note 5.)

SLETH L.E. length of the lifting surface which produces the vortex lift augmentation.

XCNTD X-coordinate of the assumed centroid of augmented vortex lift.

YCNTD Y-coordinate of the centroid of augmented vortex lift.

XTILT X-distance from the outboard L.E. of the originating surface to the T.E. of the receiving surface over which the vortex is assumed to pass. (See Note 5.)

SR The lifting surface number receiving the augmented vortex lift effect.

Group 43

HEIGHT = Height of 3/4 chord point of mean geometric chord from ground if NGRD = 1.

= 0., otherwise.

ATT = Pitch attitude angle of wings, in degrees.

= 0. if NGRD = 0.

Group 44 must be omitted if LAT $\neq$ 1.

Group 44

P = $pb/2V_\infty$, the maximum roll helical angle in radian.

BK = Sideslip angle in radian.

RL = $rb/2V_\infty$, the yaw rate parameter, in radian. If RL = 0, then $pb/2V_\infty = P\cos(\alpha)$ and $rb/2V_\infty = P\sin(\alpha)$.

Group 45

KF = 1 if a fuselage is present

= 0 otherwise

NT = number of Fourier-series terms,excluding the zero-order term, to satisfy the body surface boundary condition. Usually 2 or 3 will be sufficient. 2 is recommended. For a configuration with highly interacting surfaces, such as the F-18, use 1.

NCUM = number of circumferential locations on the body surface at which the pressure loading is to be computed. For midwing configurations, use even number. Limited to 10. Use at least 7.

NF = number of control stations along the fuselage axis. Limited to 20. Use at least 12.

IBY = 1, if the body shape in side view is different from that in top view and it is to be input. To be used only in the method of suction analogy.

= 0, otherwise.

IBCM = 1, if body camber will be input,

= 0. otherwise.

*** If KF = 0, Groups 46-68 must be omitted. ***

Group 46

XAS(1) X-coordinate of the fuselage nose.

XAS(2) X-coordinate of the fuselage tail.

FUSIND = 0. if the fuselage geometry is to be defined analytically in Functions FUR(X) and SLOP(X), (i.e. r(x) and r(x) $\frac{dr(x)}{dx}$, respectively).

= 1. otherwise.

FUSNO = number of fuselage stations to be input to define the fuselage shape if FUSIND = 1. Limited to 21.

= 0. otherwise.

FSHAP = 1. if the input fuselage shape is to be interpolated through cubic spline interpolation. In this case, intervals between x-coordinates in Group 48 should not vary widely.

= 0. if the input points for the fuselage shape are connected with straight segments.

= arbitrary if FUSIND = 0.

X1 = the body station in fraction of body length at which the rate of change of cross-sectional area with body length first reaches maximum negative value. See Datcom. In the method of free vortex filaments, X1 can best be calculated based on the x-coordinate of the midpoint of vertical-tail root chord.

X2 the X1 value for stability derivatives. Similar to X1, except based on the side view of the body. For the method of free vortex filaments, set X2 = X1.

X3 the nose length on which body vortex lift is developed.

Group 47

ISYM = 0 for noncircular cross section

= 1 for circular cross section

JSCT Number of circumferential stations on the right side to be input. Limited to 21. Set to 0 if ISYM = 1.

Groups 48 and 53 must be omitted if FUSIND = 0

Group 48

XFF(I) X-coordinates of fuselage to input its radius. FUSNO numbers.

If ISYM = 0, skip Group 49

Group 49

RFF(I) radii of fuselage at XFF(I) stations.

Groups 50 and 51 must be omitted if IBY = 0.

Group 50

XFD(I) x-coordinates of fuselage. FUSNO numbers.

Group 51

RFD(I) radii of fuselage in side view

Groups 52 and 53 must be omitted if ISYM = 1.

Group 52

TSF(I) angular coordintes in degrees measured from the upward vertical line to define the radius on the right side, JSCT values.

Group 53

RSF(I) the corresponding radii

Groups 54-56 must be omitted if IBCM = 0.

Group 54

NBCM number of z-coordinates of body camber to be input. Limited to 21.

Group 55

XBCM(I) x-coordinates of fuselage.

Group 56

ZBCM(I) z-coordinates of fuselage camber.

Group 57

IFORB1 = 1, if the fuselage forebody vortices will be calculated. In this case, X3 in Group 46 should not be zero.

= 0, otherwise

Groups 58-68 must be omitted if IFORB1 = 0.

Group 58

IPRINT = 0 if only lateral force information will be printed

= 1 if more information will be printed

IXCASE = 0 for a cone in laminar separation with a circular or elliptic cross section

= 1 for a tangent ogive in laminar separation with a circular or elliptic cross section

= 2 for a chine cross section

= 3 for a general cross section

ISY = 0 for the first branch of solutions only (symmetrical or nearly symmetrical in sideslip)

= 1 for the second branch of solutions (asymmetrical. Note: See NASA CR-4122, 1988)

ISHARP = 0 for cross sections without sharp edges

= 1 for cross sections with sharp edges

NCIRCLE = 0 for a circular cross section

= 1 for a noncircular cross section

Group 59

BSEP an index for forebody separation condition based on Stratford's separation prediction method.

= 0, Stratford's method is not used

= 1,   laminar separation

= 2,   turbulent separation

Set BSEP = 0 if IXCASE is not equal to 3.

** COEFF1 - COEFF3 represent amount of perturbations applied to symmetric solution to obtain the initial guess of asymmetric vortex coordinates and strengths. **

COEFF1 fraction of the converged symmetric solution for the lateral coordinate (y) of the left vortex.
Typically, 0.0 for a cone and 0.0 ~ 0.4 for a tangent ogive

COEFF2 fraction of the converged symmetric solution for the vertical coordinate (z) of the left vortex.
Typically, 0.3 ~ 0.6 for a cone and 0.0 ~ 0.4 for a tangent ogive.

COEFF3 fraction of the converged symmetric solution for the vortex strength of the right vortex. Typically, 0.1 ~ 0.15 for a cone and 0.1 ~ 0.40 for a tangent ogive.

CSEP = 0 if the separation locations are computed internally

= 1 if the separation locations are to be input

If IXCASE = 0, 1 or, set CSEP = 0 ?

If IXCASE = 3 and Stratford's separation prediction method is used, set CSEP = 0. If Stratford's method is not used, set CSEP = 1.

Group 60

XORING(I) I = 1, NEVA initial values of vortex locations and strengths in the transferred (i.e., circle plane) at the first station at which symmetric vortex flow may begin. NEVA = 6 if ISHARP = 0 and = 8 if ISHARP = 1.

I = 1: y coordinate of the right vortex

I = 2: z coordinate of the right vortex

I = 3: y coordinate of the left vortex

I = 4: z coordinate of the left vortex

I = 5: strength of the right vortex

I = 6: strength of the left vortex

I = 7: separation coefficient of the right vortex

I = 8: separation coefficient of the left vortex

(See Note 6 for some typical values.)

Groups 61 - 63 must be omitted if CSEP $\neq$ 1.

Group 61

IFFN number of stations on the forebody to input the separation locations. These stations should coincide with those in Group 48 on the forebody. These separation locations are needed if ISHARP = 1

Group 62

THSEP(I,1), I=1,IFFN Separation positions in angular coordinates (degrees) measured from the y-axis (horizontal) for right side.

Group 63

THSEP(I,2), I=1,IFFN Separation positions in angular coordinates (degrees) measured form the positive y-axis for the left side.

Group 64

MO2 the number of stations to input body's circumferential coordinates for numerical mapping. Typically, a value of 21 for a chine cross section is needed.

N20 the number of mapping coefficients needed to map an input cross section to a circle. A typical value for a chine cross section is 30.

ITMAX maximum number of iterations in numerical mapping. A typical value for a chine cross section is 150.

Group 65

P20 an iteration factor to help convergence in numerical mapping. $-1 < P20 < 0$. A typical value is -0.5.

Groups 66-68 must be omitted if IXCASE $\neq$ 2.

Group 66

IFFN number of stations on the forebody to input Groups 67 and 68.

Group 67

THETAU(I), I=1, IFFN magnitude of the interior tangent angle in degrees of the upper surface at the sharp edge measured relative to the horizontal axis.

Group 68

THETAL(I), I=1, IFFN magnitude of the interior tangent angle in degrees of the lower surface at the sharp edge measured relative to the horizontal axis.

(See Note 7 for THETAU and THETAL.)

Group 69

IWAKE = 0 if a deformed wake alone is not to be calculated.

= 1 if the trailing wake shape is to be calculated. In this case, set LEV = 0 in Group 79.

If IWAKE = 0, skip Groups 70-78.

Group 70

NOLD2 = 0 if the intial wake geometry is to be generated by the program.

= 1 if the initial wake geometry will be input from File No. 19.

NOLD = 0 if the calculated symmetric wake shape is to be saved on File No. 18.

= 1 if the symmetric wake shape from File No. 18 is to be input for restart.

NOLD1 = 0 if the calculated wake shape in sideslip is to be saved on File No. 18.

= 1 if the wake shape in sideslip is to be input from File No. 18 for restart.

Group 71

NITER Number of iterations for wake deformation, 5 to 10 typically,

JITER Number of iterations to determine the location of discrete vortex elements (such as strake vortex), 5 to 10 typically.

= 0 if there are no discrete vortices.

If NOLD2 = 0, skip Group 72. Group 72 is repeated NSUR times.

Group 72

KKI(K), K=1, NSUR Number of segments into which a vortex strip is divided for each lifting surface.

If JITER = 0, skip Groups 73-76.

Group 73

LPP Number of discrete vortices. Limited to 4.

NSTAR the inboard vortex strip number at which the first (most inboard) discrete vortex is located.

NSECT the section that a discrete vortex (i.e., the strake vortex) is located.

Group 74

(XDV(I), I=1, LPP) the x-locations at which discrete vortices start to deform.

Group 75

(YDV(I), I=1,LPP) the y-locations at which discrete vortices start to deform.

Group 76

(ZDV(I), I=1, LPP) the z-locations at which discrete vortices start to deform.

Group 77

NMAX1 =1 if the total velocity at specified points are to be calculated.

=0 otherwise.

If NMAX1 = 0, skip Group 78.

Group 78

XY1 x- and z-coordinates at which total velocity is to be calculated.

YZ1 (The program will automatically select a y- range in the calculation.)

Group 79

LEV = 1 if vortex separation is to be modeled by a vortex-filament model (Set IWAKE = 0 in Group 69. The wake shape is automatically calculated.)

= 0 otherwise.

If LEV = 0, Skip Groups 80-87

Group 80

NSUF Number of lifting surfaces on which vortex separation occurs.

NPC = 0 if induced velocities are evaluated directly at the middle of each segment of the leading -edge elements.

= 1 if induced velocities are evaluated at the middle of each strip of the leading-edge elements and extrapolated to the location of each segment.

ICP is the number of iterations at which a reduced relaxation parameter is used for the leading-edge vortex elements. For cases with section data in the input (i.e., NLDMM = 1) set ICP = MITE. Otherwise, ICP = 1.

MSTW = 0 if induced velocities are evaluated at the midpoint of each segment of the wake element.

= 1 if induced velocities are evaluated at the midpoint of each strip of the wake elements and extrapolated to the location at each segment.

MITE maximum number of iterations to be performed (7 to 9 typically).

Groups 81-85 are to be repeated NSUF times.

Group 81

ITIPV = 0 if no side-edge separated vortex is included in the calculation.

= 1 otherwise.

MST last vortex strip number of the strake section. If there is only one vortex system, set MST = 0.

Group 82

MULTIG = 1 if the number of wake elements is halved during initial few iterations to reduce the computing time.

= 0 if the number of wake elements is not reduced.

KITR the iteration number below which the number of wake elements is halved. A value of 4 is recommended.

Group 83

DELTA length of a segment of leading-edge free vortex elements (may be taken as 0.1 ~ 0.15 C_R in symmetrical flow, and 0.05 ~ 0.1 C_R in asymmetrical flow, where C_R is the root chord).

DELT length of a segment of wake elements (may be taken as DELTA).

XEND length from the most downstream point of the configuration beyond which the vortex is represented by a single element going to ∞.

Group 84

NBRR number of constant x-locations where ΔC_p's are to be interpolated. Limited to 25.

IF NBRR = 0, skip Group 85

Group 85

XBRR, I=1,NBRR constant x-locations where ΔC_p's are to be interpolated.

Group 86

DIF1 Relaxation factor for adjusting the position of leading-edge vortex elements. Typically, 0.5 ~ 1.0. For NLDMM = 0 (i.e., inviscid), it is suggested to set DIF1 ⩾ 1.25 (over-relaxation) and ICP = 1 (see Group 80).

DIF2 Relaxation factor for adjusting the position of wake vortex elements. Typically, 0.5 ~ 0.75. For NLDMM = 0, set DIF2 = DIF1.

Group 87

NQ1 = 1 to calculate the flow field due to roll rate

= 2 to calculate the flow field due to sideslip

= 3 to calculate the flow field due to yaw rate

= 4 if both effects of roll and yaw rates are calculated

= arbitrary if LAT = 0 (symmetrical flow) or LAT = -1.

IREA = 1 to restart the lateral-directional calculation with data saved in file 19.

= 0 otherwise

ISTAR = 1 to use the stored data in file 19 on the leading-edge and wake vortex system as the initial starting shape in symmetrical flow.

= 0 otherwise.

Notes

1. For ailerons, only those on the right wing are drescribed. Antisymmetrical deflection is assumed. Downward deflection is positive. For rudders with conventional positive deflections (i.e., deflected to the left), the input angles must be negative.

   For flap angles given normal to a hinge line, they must be converted to those measured in the streamwise direction for input as "DF". The conversion relation can be derived by vector analysis and is given as follows:

$$\tan \delta_s = \tan \delta_n \cos \Lambda$$

   where δ_s is the flap angle measured in the streamwise direction, δ_n is that normal to the hinge line and Λ is the sweep angle of the hinge line.

2. For a conical camber, a useful mathematical description of the shape can be found in Appendix B of reference 7.

   Equal spacing of input points is the best if cubic spline is to be used for interpolation.

3. For a plane flap, a useful exact description of its geometry and deflection can be found in Appendix B of reference 7. It can be described by the following equation

$$ax + by + cz + d = 0$$

   where

$$a = (y_4 - y_1)(z_3 - z_2) - (y_3 - y_2)(z_4 - z_1)$$

$$b = (x_3 - x_2)(z_4 - z_1) - (x_4 - x_1)(z_3 - z_2)$$

$$c = (x_4 - x_1)(y_3 - y_2) - (x_3 - x_2)(y_4 - y_1)$$

   The streamwise slope is then given by

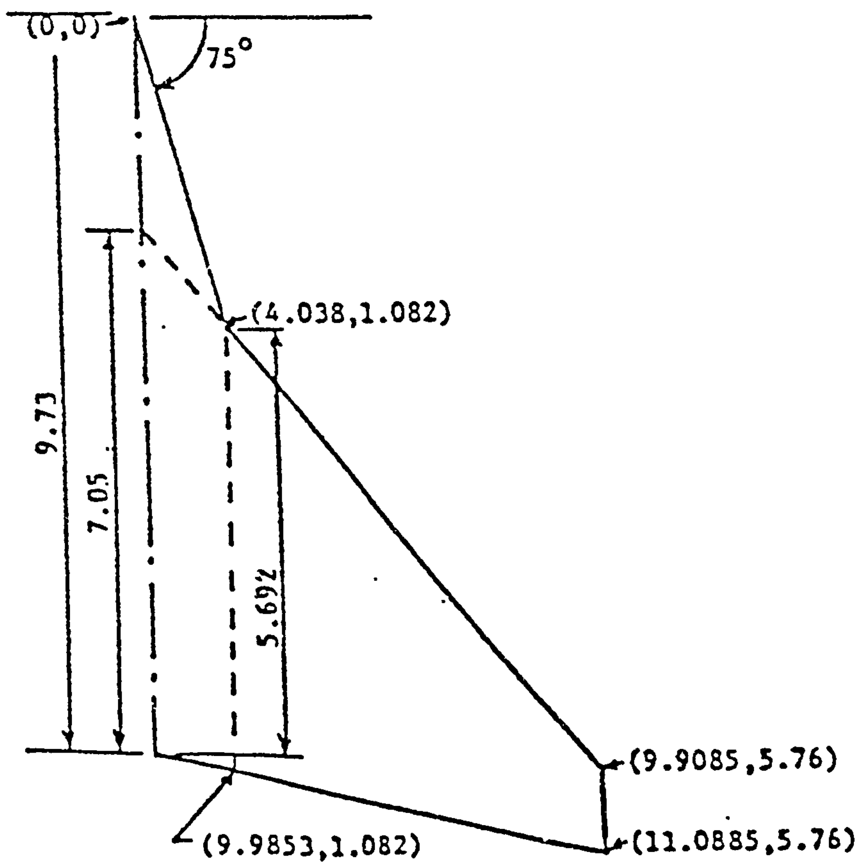
$$\frac{\partial z}{\partial x} = -\frac{a}{c}$$

4. For the input of a curved leading edge, the coordinates (x,y) of the leading edge of inboard chord are regarded as (0,0).

5. The choice of CTILT is based on reference 8. On the other hand, XTILT is to represent the severity of adverse pressure gradient over which the vortex must pass. As a result of using XTILT, the vortex may break down earlier. For a simple wing planform, both CTILT and XTILT are the same. For strake-wing configurations, they are different in general. The choice is somewhat empirical in nature. The following examples will illustrate their choice based on experience.

(1) A strake-wing configuration:

This example is taken from reference 9 and is as shown in the following sketch.



For this configuration,

Strake

$$\text{CTILT} = 5.692$$

$$\text{XTILT} = \frac{7.05}{9.73} \times 4.038 = 2.9258$$

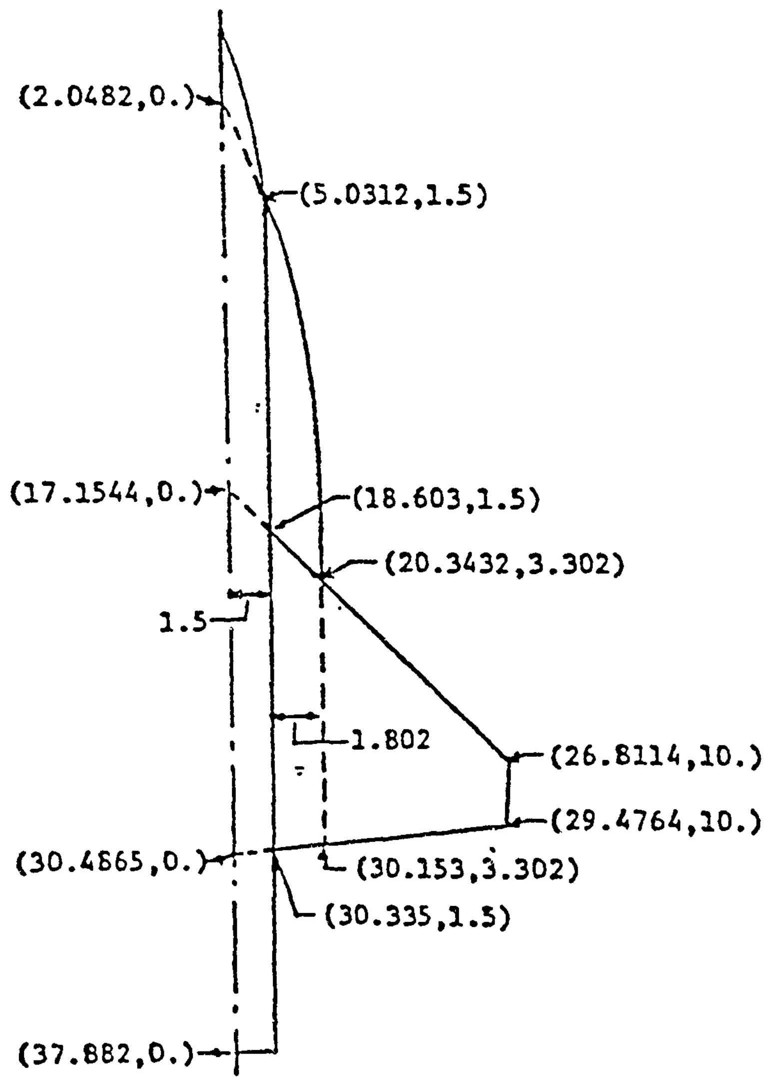
Note that for a strake, XTILT is to be expressed in terms of the root chord (4.038) of an equivalent delta wing for the strake. Similarly,

Wing

$$\text{CTILT} = 9.9853 - 9.9085 = 0.0768$$

$$\text{XTILT} = \text{CTILT} = 0.0768$$

(2) A strake-wing body configuration:
This example is taken from reference 10 and is as shown in the following sketch.



In this case, the aft fuselage will contribute to the adverse pressure gradient for the strake vortex. The projected fuselage area on the X-Y plane downstream of the wing leading edge can be calculated to be

$$\frac{37.882 - 17.1544 + 37.882 - 18.603}{2} \times 1.5 = 30.0050.$$

Divided by the total width of the strake region, this is equivalent to a streamwise length of

$$\frac{30.0050}{1.5 + 1.802} = 9.0869.$$

Therefore, the total distance of adverse pressure region is

$$9.0869 + (30.335 - 18.603) = 20.8189$$

This must be expressed in terms of the root chord of an equivalent delta wing of the strake as

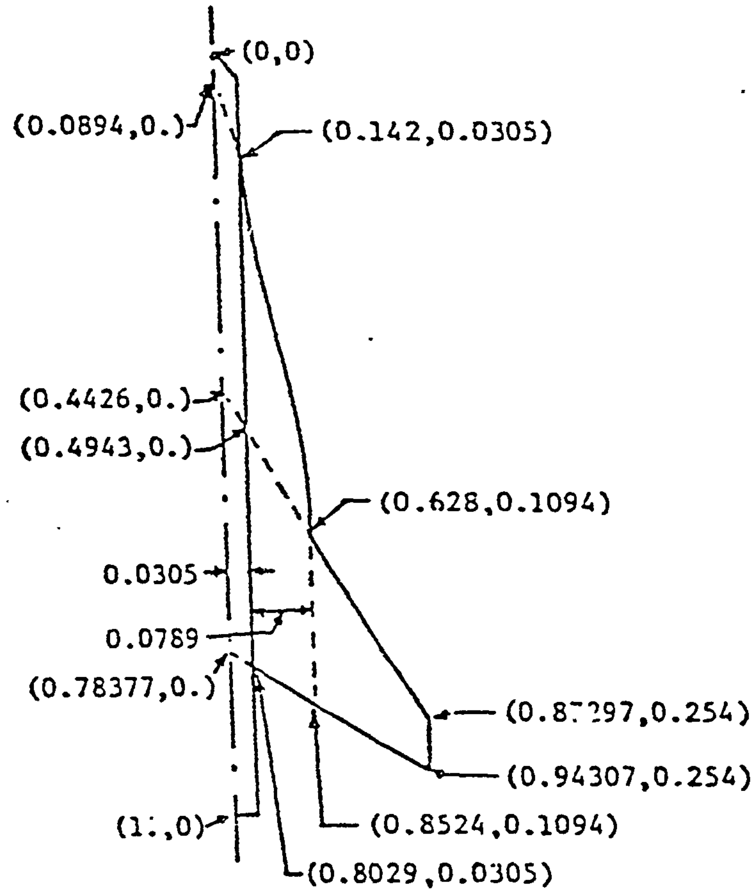
$$XTILT = \frac{20.8189}{30.4865 - 2.0482} \times (20.3432 - 5.0312) = 11.21$$

(for strake vortex)

CTILT is given by

$$CTILT = 30.335 - 20.3432 = 9.9918 \text{ (for strake vortex)}$$

(3) Second strake-wing body configuration:
This example is taken from reference 11 and is as shown in the following sketch.



The projected fuselage area on the X-Y plane downstream of the wing leading edge can be calculated to be

$$\frac{1 - 0.4426 + 1 - 0.4943}{2} \times 0.0305 = 0.016212.$$

Divided by the total width of the strake region, this is equivalent to a streamwise length of

$$\frac{0.016212}{0.0305 + 0.0789} = 0.1482.$$

It follows that the total distance of adverse pressure region is

$$0.8029 - 0.4943 + 0.1482 = 0.4568.$$

This is expressed in terms of the root chord of an equivalent delta wing of the strake as

$$XTILT = \frac{0.4568}{0.78377 - 0.0894} \times (0.6280 - 0.1420) = 0.32$$
(for strake vortex)

CTILT is given by

$$CTILT = 0.8029 - 0.6280 = 0.1749 \text{ (for strake vortex)}$$

(4) <u>An F-18 Configuration</u>

Based on the sketch as shown, the projected fuselage area on the X-Y plane downstream of the wing leading edge can be calculated to be

$$\frac{55.2636 - 26.256 + 55.2636 - 27.069}{2} \times 1.9 = 54.342$$

Divided by the total width of the strake region, this is equilvalent to a streamwise length of

$$\frac{54.342}{4.5} = 12.076$$

Therefore, the total distance of adverse pressure region is

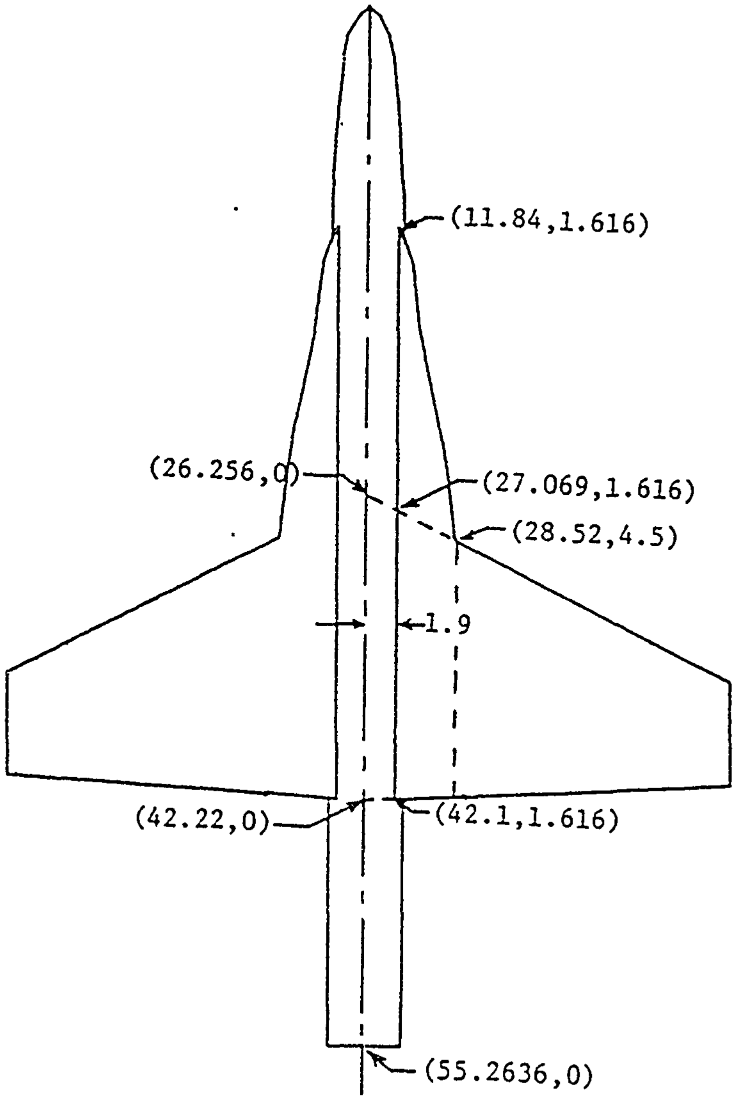
$$12.076 + (42.1 - 27.069) = 27.107$$

This must expressed in terms of the root chord of an equivalent delta wing of the strake. Assume that forebody vortex is present. Then

$$XTILT = \frac{27.107}{42.22 - 0} (28.52 - 11.84) = 10.71$$

CTILT is given by

$$CTILT = 42.1 - 28.52 = 13.58$$


(11.84,1.616)
(26.256,0)
(27.069,1.616)
(28.52,4.5)
1.9
(42.22,0)
(42.1,1.616)
(55.2636,0)

6. Typical input values for XORING(I)

Initial guess for tangent ogive with L/D = 5.0

Right vortex core lateral position (XORING(1))

α° \ β°	2.00	4.00	6.00	8.00	10.00
15.0	0.21	0.05	-0.04	-0.07	-0.05
20.0	0.22	0.16	0.03	-0.03	-0.09
25.0	0.27	0.18	0.06	-0.03	-0.09
30.0	0.27	0.27	0.27	0.27	0.27
35.0	0.27	0.27	0.27	0.27	0.27
40.0	0.27	0.27	0.27	0.27	0.27
45.0	0.27	0.27	0.27	0.27	0.27
50.0	0.27	0.27	0.27	0.27	0.27

Note: FOR $\beta=0^\circ$, set XORING(1) = 0.30 for all α's

Right vortex core vertical position (XORING(2))

α° \ β°	2.00	4.00	6.00	8.00	10.00
15.0	1.26	1.28	1.27	1.26	1.21
20.0	1.32	1.36	1.30	1.44	1.44
25.0	1.32	1.36	1.41	1.44	1.44
30.0	1.57	1.57	1.57	1.57	1.57
35.0	1.54	1.54	1.54	1.54	1.54
40.0	1.54	1.54	1.54	1.54	1.54
45.0	1.54	1.54	1.54	1.54	1.54
50.0	1.54	1.54	1.54	1.54	1.54

Note: FOR $\beta=0^\circ$, set XORING(2) = 1.15 for all α's

Initial guess for tangent ogive with L/D = 5.0

Left vortex core lateral position (XORING(3))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	-0.59	-0.79	-0.70	-0.62	-1.00
20.0	-0.60	-0.85	-0.80	-1.03	-1.05
25.0	-0.64	-0.85	-0.97	-1.03	-1.05
30.0	-1.02	-1.02	-1.02	-1.02	-1.02
35.0	-1.02	-1.02	-1.02	-1.02	-1.02
40.0	-1.02	-1.02	-1.02	-1.02	-1.02
45.0	-1.02	-1.02	-1.02	-1.02	-1.02
50.0	-1.02	-1.02	-1.02	-1.02	-1.02

Note: FOR $\beta = 0°$, set XORING(3) = -0.30 for all α's

Left vortex core vertical position (XORING(4))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	2.05	1.84	1.49	1.32	1.50
20.0	2.18	2.18	2.05	1.89	1.74
25.0	2.18	2.18	2.05	1.89	1.74
30.0	2.40	2.40	2.40	2.40	2.40
35.0	2.40	2.40	2.40	2.40	2.40
40.0	2.40	2.40	2.40	2.40	2.40
45.0	2.40	2.40	2.40	2.40	2.40
50.0	2.40	2.40	2.40	2.40	2.40

Note: FOR $\beta = 0°$, set XORING(4) = +1.15 for all α's

Initial guess for tangent ogive with L/D = 5.0

Right vortex core strength (XORING(5))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	0.45	0.49	0.44	0.48	0.56
20.0	0.60	0.64	0.60	0.72	0.74
25.0	0.61	0.64	0.68	0.72	0.74
30.0	0.99	0.99	0.99	0.99	0.99
35.0	0.99	0.99	0.99	0.99	0.99
40.0	0.99	0.99	0.99	0.99	0.99
45.0	0.99	0.99	0.99	0.99	0.99
50.0	0.99	0.99	0.99	0.99	0.99

Note: FOR $\beta = 0°$, set XORING(5) = 0.20 for all α's

Left vortex core strength (XORING(6))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	0.29	0.28	0.17	0.16	0.10
20.0	0.40	0.43	0.40	0.44	0.44
25.0	0.43	0.43	0.44	0.44	0.44
30.0	0.75	0.75	0.75	0.75	0.75
35.0	0.75	0.75	0.75	0.75	0.75
40.0	0.75	0.75	0.75	0.75	0.75
45.0	0.75	0.75	0.75	0.75	0.75
50.0	0.75	0.75	0.75	0.75	0.75

Note: FOR $\beta = 0°$, set XORING(6) = 0.20 for all α's

Initial guess for tangent ogive with L/D = 3.5

Right vortex core lateral position (XORING(1))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	0.11	0.05	-0.02	-0.02	-0.02
20.0	0.11	0.05	0.03	-0.05	NO
25.0	0.31	0.16	0.07	0.05	-0.05
30.0	0.32	0.25	0.12	0.05	-0.04
35.0	0.33	0.28	0.18	0.06	-0.03
40.0	0.27	0.27	0.27	0.27	0.27
45.0	0.27	0.27	0.27	0.27	0.27
50.0	0.27	0.27	0.27	0.27	0.27

Note: FOR $\beta=0°$, set XORING(1) = 0.30 for all α's

Right vortex core vertical position (XORING(2))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	1.25	1.25	1.21	1.18	1.18
20.0	1.26	1.25	1.21	1.17	NO
25.0	1.22	1.32	1.34	1.32	1.29
30.0	1.22	1.30	1.36	1.32	1.44
35.0	1.30	1.32	1.36	1.41	1.44
40.0	1.54	1.54	1.54	1.54	1.54
45.0	1.54	1.54	1.54	1.54	1.54
50.0	1.54	1.54	1.54	1.54	1.54

Note: FOR $\beta=0°$, set XORING(2) = 1.15 for all α's

Initial guess for tangent ogive with L/D = 3.5

Left vortex core lateral position (XORING(3))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	-0.52	-0.60	-0.64	-0.57	-0.57
20.0	-0.52	-0.60	-0.64	-0.49	NO
25.0	-0.56	-0.76	-0.85	-0.86	-0.81
30.0	-0.60	-0.78	-0.91	-0.95	-1.11
35.0	-0.68	-0.81	-0.95	-1.05	-1.11
40.0	-1.02	-1.02	-1.02	-1.02	-1.02
45.0	-1.02	-1.02	-1.02	-1.02	-1.02
50.0	-1.02	-1.02	-1.02	-1.02	-1.02

<u>Note</u>: FOR $\beta=0°$, set XORING(3) = <u>-0.30</u> for all α's

Left vortex core vertical position (XORING(4))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	1.84	1.75	1.67	1.44	1.44
20.0	1.83	1.75	1.67	1.30	NO
25.0	2.16	2.10	1.98	1.84	1.64
30.0	2.22	2.27	2.14	2.00	1.95
35.0	2.24	2.33	2.28	2.11	1.95
40.0	2.40	2.40	2.40	2.40	2.40
45.0	2.40	2.40	2.40	2.40	2.40
50.0	2.40	2.40	2.40	2.40	2.40

<u>Note</u>: FOR $\beta=0°$, set XORING(4) = <u>1.15</u> for all α's

Initial guess for tangent ogive with L/D = 3.5

Right vortex core strength (XORING(5))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	0.35	0.34	0.31	0.26	0.26
20.0	0.35	0.34	0.31	0.24	NO
25.0	0.47	0.54	0.55	0.52	0.48
30.0	0.54	0.59	0.63	0.60	0.75
35.0	0.64	0.65	0.69	0.72	0.75
40.0	0.99	0.99	0.99	0.99	0.99
45.0	0.99	0.99	0.99	0.99	0.99
50.0	0.99	0.99	0.99	0.99	0.99

Note: FOR $\beta = 0°$, set XORING(5) = 0.20 for all α's

Left vortex core strength (XORING(6))

$\alpha°$ \ $\beta°$	2.00	4.00	6.00	8.00	10.00
15.0	0.22	0.18	0.21	0.05	0.05
20.0	0.22	0.18	0.12	0.06	NO
25.0	0.34	0.36	0.34	0.29	0.24
30.0	0.39	0.41	0.42	0.39	0.49
35.0	0.46	0.46	0.47	0.49	0.49
40.0	0.75	0.75	0.75	0.75	0.75
45.0	0.75	0.75	0.75	0.75	0.75
50.0	0.75	0.75	0.75	0.75	0.75

Note: FOR $\beta = 0°$, set XORING(6) = 0.20 for all α's

Initial guess for tangent ogive(chine cross section)

with L/D = 5.0

Right vortex core lateral position (XORING(1))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	1.105	1.100	1.100	1.100	1.091	1.090
25.00	1.105	1.110	1.110	1.104	1.099	1.097
30.00	1.105	1.119	1.108	1.108	1.108	1.108
35.00	1.105	1.114	1.114	1.114	1.114	1.114
40.00	1.105	1.119	1.119	1.119	1.119	1.119
45.00	1.105	1.125	1.125	1.125	1.125	1.125
50.00	1.105	1.133	1.133	1.133	1.133	1.133

Right vortex core vertical position (XORING(2))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.469	0.431	0.431	0.431	0.368	0.359
25.00	0.469	0.476	0.476	0.441	0.422	0.403
30.00	0.469	0.521	0.503	0.503	0.503	0.503
35.00	0.469	0.562	0.562	0.562	0.562	0.562
40.00	0.469	0.602	0.602	0.602	0.602	0.602
45.00	0.469	0.649	0.649	0.649	0.649	0.649
50.00	0.469	0.709	0.709	0.709	0.709	0.709

Left vortex core lateral position (XORING(3))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	-1.105	-1.111	-1.111	-1.111	-1.507	-1.638
25.00	-1.105	-1.126	-1.126	-1.164	-1.776	-1.981
30.00	-1.105	-1.153	-1.745	-1.745	-1.745	-1.745
35.00	-1.105	-1.842	-1.842	-1.842	-1.842	-1.842
40.00	-1.105	-1.999	-1.999	-1.999	-1.999	-1.999
45.00	-1.105	-2.116	-2.116	-2.116	-2.116	-2.116
50.00	-1.105	-2.242	-2.242	-2.242	-2.242	-2.242

Left vortex core vertical position (XORING(4))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.469	0.518	0.518	0.518	1.366	1.507
25.00	0.469	0.585	0.585	0.747	1.937	2.118
30.00	0.469	0.699	2.427	2.427	2.427	2.427
35.00	0.469	3.463	3.463	3.463	3.463	3.463
40.00	0.469	4.699	4.699	4.699	4.699	4.699
45.00	0.469	6.031	6.031	6.031	6.031	6.031
50.00	0.469	7.533	7.533	7.533	7.533	7.533

Right vortex strength (XORING(5))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.789	0.734	0.734	0.734	0.745	0.742
25.00	0.789	0.812	0.812	0.783	0.951	0.923
30.00	0.789	0.898	1.230	1.230	1.230	1.230
35.00	0.789	1.542	1.542	1.542	1.542	1.542
40.00	0.789	1.988	1.988	1.988	1.988	1.988
45.00	0.789	1.958	1.958	1.958	1.958	1.958
50.00	0.789	2.172	2.172	2.172	2.172	2.172

Left vortex strength (XORING(6))

α \ β	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.789	0.853	0.853	0.853	1.213	1.223
25.00	0.789	0.938	0.938	1.073	1.394	1.389
30.00	0.789	1.058	1.610	1.610	1.610	1.610
35.00	0.789	1.851	1.851	1.851	1.851	1.851
40.00	0.789	1.988	1.988	1.988	1.988	1.988
45.00	0.789	2.085	2.085	2.085	2.085	2.085
50.00	0.789	2.193	2.193	2.193	2.193	2.193

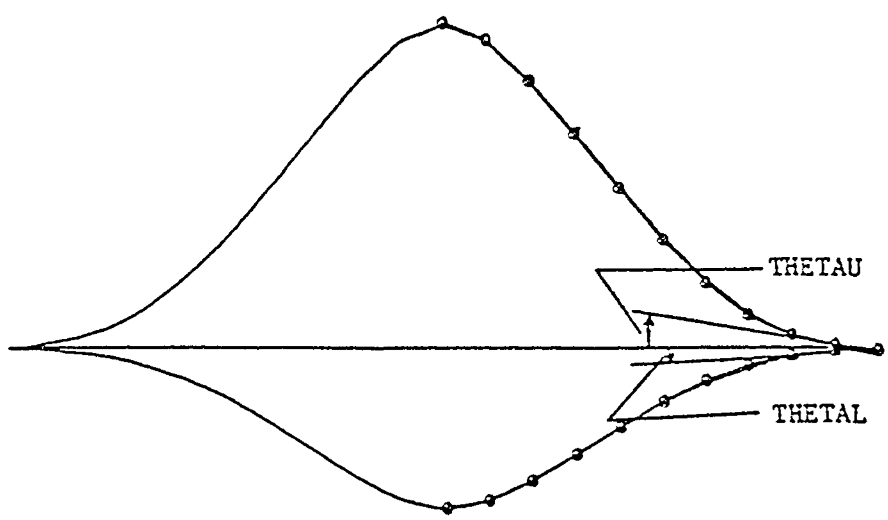
Right vortex separation coefficient (XORING(7))

β / α	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.257	0.266	0.266	0.266	0.264	0.265
25.00	0.257	0.223	0.223	0.227	0.206	0.210
30.00	0.257	0.191	0.163	0.163	0.163	0.163
35.00	0.257	0.155	0.155	0.155	0.155	0.155
40.00	0.257	0.132	0.132	0.132	0.132	0.132
45.00	0.257	0.098	0.098	0.098	0.098	0.098
50.00	0.257	0.086	0.086	0.086	0.086	0.086

Left vortex separation coefficient (XORING(8))

β / α	0.000	2.000	4.000	6.000	8.000	10.000
20.00	0.257	0.247	0.247	0.247	0.207	0.206
25.00	0.257	0.208	0.208	0.194	0.170	0.171
30.00	0.257	0.176	0.143	0.143	0.143	0.143
35.00	0.257	0.141	0.141	0.141	0.141	0.141
40.00	0.257	0.124	0.124	0.124	0.124	0.124
45.00	0.257	0.095	0.095	0.095	0.095	0.095
50.00	0.257	0.085	0.085	0.085	0.085	0.085

7. THETAU and THETAL are defined as follows.



OUTPUT VARIABLES

<u>In File #21:</u>

(1) At the beginning of the output, all input data will be printed.

HALFSW = half of reference wing area

CREF = reference chord

(2) Turbulent skin friction coefficient is calculated with the following formula:

$$c_f = 0.455/(\log_{10} RN)^{2.58}/(1. + 0.144M^2)^{0.58}$$

where RN for each aerodynamic component is based on the mean geometric chord or the body length.

(3) Tip suction

X/C nondimensional x coordinate with respect to tip chord

CTIP = $S_t(x)/(\frac{1}{2}\rho V_\infty^2 c_t)$, where S_t is the tip suction force per unit length and c_t is the tip chord

(4) Pressure distribution in attached flow or vortex flow if LEV = 1.

XV nondimensional chordwise location (referred to local chord)

YV nondimensional spanwise location (referred to semispan of the lifting surface)

CP = ΔC_p

(5) Sectional characteristics

Y/S	nondimensional y-station, referred to semispan of the lifting surface
CL	sectional lift coefficient
CM	sectional pitching moment coefficient about the Y axis
CT	sectional leading-edge thrust coefficient
CDI	sectional induced drag coefficient
CS*C	sectional suction coefficient multiplied by local chord
CAV	sectional axial (along X-axis) force coefficient due to leading edge vortex

(6) The next group of output variables is the overall aerodynamic characteristics in attached potential flow. If ALPCON = 1.0, the lift and pitching moment coefficients will be C_{L_α} and C_{M_α}.

(7) If ALPCON = 1.0, the factors, K_p, $K_{v\ell e}$, and $K_{v,se}$ etc. to be used in the method of suction analogy for a noncambered wing will be printed next. They are used in the following formulas:

$$C_L = K_p \sin\alpha \cos^2\alpha + \left(K_{v,\ell e} + K_{v,se}\right)\sin^2\alpha \cos\alpha$$

$$C_{D_i} = C_L \tan\alpha$$

$$C_m = K_p \sin\alpha \cos\alpha \frac{\bar{x}_p}{C_{ref}} + K_{v,\ell e} \sin^2\alpha \frac{\bar{x}_{\ell e}}{C_{ref}} + K_{v,se} \sin^2\alpha \frac{\bar{x}_{se}}{C_{ref}}$$

(8) If a fuselage is present, the pressure coefficient (C_p) at (X/L, THETA) will be printed, where L is the fuselage length and THETA (i.e., θ) is measured clockwise (facing upstream) from the positive Z axis (i.e. upwards). The fuselage local loading is defined as

$$C_N = \frac{-1}{r_{ref}} \int_0^{2\pi} C_p (r d\theta) \cos \theta \, .$$

The overall fuselage aerodynamic coefficients are all based on the input reference area and chord.

(9) Next, the attached flow results are summarized. For the lift coefficient,

CL(LS) the total lift coefficient from all lifting surfaces

CLF the total lift coefficient from the fuselage

CL = CL(LS) + CLF

Similar definitions apply to C_D and C_m.

CDVIS = turbulent skin friction coefficient

Note: This group will be printed also for vortex flow if LEV = 1.

(10) Total aerodynamic coefficients to be used in the method of suction analogy are summarized as follows, using the lift coefficient (CL) as an example.

CLP the "potential-flow" component of C_L

CLVL the leading-edge vortex lift

CLVSE the side-edge (i.e. tip) vortex lift

CLVAUG the augmented vortex lift

CLDVP the "potential flow" component of C_L due to the strake discrete vortex

CLDVV the vortex lift component due to the strake discrete vortex

CLF the fuselage lift

CL total lift coefficient

CAXP the axial force coefficient in potential flow, negative for pointing forward

CAXV the axial force coefficient due to leading-edge vortex

(11) For an axymmetrical configuration or a configuration with lateral or directional control input, the resulting rolling (CL) and yawing (CN) moments will be printed for both attached and vortex flows, with and without tip suction effect. Based on experience, those without tip suction effect seem to agree better with limited windtunnel data.

(12) The lateral-directional stability derivatives are defined in accordance with standard definitions as follows:

$$\text{CYB} = \frac{\partial C_y}{\partial \beta}, \quad C_y = \text{side force}/q\, S_{ref}$$

$$\text{CLB} = \frac{\partial C_\ell}{\partial \beta}, \quad C_\ell = \text{rolling moment}/q\, S_{ref}\, b_{ref}$$

$$\text{CNB} = \frac{\partial C_n}{\partial \beta}, \quad C_n = \text{yawing moment}/q\, S_{ref}\, b_{ref}$$

$$\text{CYP} = \frac{\partial C_y}{\partial \bar{p}}, \text{ where } \bar{p} = pb/2V_\infty \text{ is an input variable and } p \text{ is the roll rate}$$

$$\text{CLP} = \frac{\partial C_\ell}{\partial \bar{p}}$$

$$\text{CNP} = \frac{\partial C_n}{\partial \bar{p}}$$

$$\text{CYR} = \frac{\partial C_y}{\partial \bar{r}}, \text{ where } \bar{r} = rb/2V_\infty \text{ is an input variable and } r \text{ is the yaw rate}$$

$$\text{CLR} = \frac{\partial C_\ell}{\partial \bar{r}}$$

$$\text{CNR} = \frac{\partial C_n}{\partial \bar{r}}$$

(13) The bending moment distribution and the bending moment coefficients at the root chord for the attached flow will be printed next in the method of suction analogy.

(14) The last portion of the output is for the bending moment distribution and the bending moment coefficients at the root chord with vortex lift effect.

In File #26:

(1) Coordinates of leading-edge vortex filaments:

Lifting-surface number is followed by the vortex filament number on that surface, e.g., "1 1".

x-coordinates of all segments on a filament

y-coordinates of all segments on a filament

z-coordinates of all segments on a filament.

(2) Coordinates of wake-vortex elements:

The definitions of variables are the same as those for the leading-edge vortex filaments.

(3) Spanwise pressure distribution (ΔC_p) at specified constant x-stations.

(4) Summary of total C_L, C_m, and C_D for each iteration

(5) Summary of force calculation on free vortex filaments. All force components are nondimensionalized with individual lifting surface areas.

SFAC Sum of absolute values of all force component in the x,y,z directions for each lifting surface.

TFX Algebraic sum of x-components of forces for each lifting surface.

TFY Algebraic sum of y-components of forces for each lifting surface.

TFZ Algebraic sum of z-components of forces for each lifting surface

TFO Vector sum of TFX, TFY, and TFZ for each lifting surface.

RES Vector sum of all TFX, TFY, and TFZ added algebraically for multiple surfaces.

JOB CONTROL SET-UP

Files Used in Execution

Seven (7) working files numbered below are released after execution:

11, 12, 13, 14, 15, 16, 25

File 18 is used to store results for cases with wake deformation calculation, i.e., IWAKE = 1.

File 19 is used to store results of both symmetrical and asymmetrical flow calculations for restart.

File 26 is used to store results for cases with edge-separated free vortex sheets, i.e., LEV = 1.

File 20 is the input data file. See main program (INPT = 20).

File 21 is the main output file. See main program (JPT = 21).

Note: The number of files actually used in a given job depends on the type of user's options. Not all files are used in a given job.

A TYPICAL JOB CONTROL SET-UP FOR THE VAX-8600 COMPUTERS

```
$FOR PL1
$FOR PL2
$FOR PL3
$FOR PL4
$FOR PL5
$FOR PL6
$FOR PL61
$FOR PL62
$FOR PL71
$FOR PL72
$FOR PL8
$FOR PL9
$FOR PL10
$FOR PL11
$LINK/EXE=P1. PL1,PL2,PL3,PL4,PL5,PL61,PL62,PL71,PL72,PL8,PL9,PL10,PL11
$AS D1.TMP FOR011
$AS D2.TMP FOR012
$AS D3.TMP FOR013
$AS D4.TMP FOR014
$AS D5.TMP FOR015
$AS D6.TMP FOR016
$AS D7.TMP FOR025
$AS D8. FOR018
$AS D9. FOR019
$AS DAN FOR026
$AS FL06.DAT FOR020
$AS LIST1.DAT FOR021
$RUN P1
```

A TYPICAL JOB CONTROL SET-UP FOR VPS-32

```
/JOB
/NOSEQ
LAN2,STVPS.
USER, (VALIDATION INFORMATION)
RESOURCE(TL=1000,LP=50,WS=6500,JCAT=SMBAT)
PATTACH,FORT77X.
FTN200(L=COMPLAN,E=COMPLAN,BINARY=BFILE/200,OPT=0)
REQUEST,OUT26/1500,T=P.
REQUEST,OUT6/1500,T=P.
LOAD(BFILE,CN=GO/1000,GRLPALL= )
GO.
SUMMARY.
DAYFILE,DAYGLAN.
TONOS(Z,C6UD=DAYGLAN,OUT6,OUT26,JCS="ACCOUNT AND MACHINE INFORMATION")
EXIT.
PATTACH,UTILITY.
IDUMP,L=L1.
SUMMARY.
DAYFILE,DAYBLAN.
TONOS(Z,C6UD=DAYBLAN,L1,OUT6,COMPLAN,JCS="ACCOUNT AND MACHINE INFORMATION")
/EOR

SOURCE CODE

/EOR

DATAFILE

/EOF
```

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[4] Tseng, J. B. and Lan, C. E., "Calculation of Aerodynamic Characteristics of Airplane Configurations at High Angles of Attack," NASA CR-4182, October 1988.

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APPENDICES

APPENDIX A

- Sample Input and Output for F-16XL & F5 Configurations

APPENDIX B

- Plotting Program Using DI3000 - XPM
- Sample Input and Output for F-16XL & F5 Configurations

APPENDIX C

- Sample Plots for F-16XL & F5 Configurations

APPENDIX A

SAMPLE INPUT AND OUTPUT FOR F-16XL CONFIGURATION

SAMPLE INPUT AND OUTPUT FOR F-16XL CONFIGURATION

```
F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT
GROUP 2. NCASE, NGRD, NSUR
1 0 3
GROUP 3. LAT, IBLC, KT, IBD, NLDMM
1 0 1 1 1
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS
3 3 3 4 3 0 0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1 1 0 0 0 0 0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
6 0 0 0 0 0 0 0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
5.25 9.25 0.5 6.8 9.2 1.23 -.12 0.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS DIHED
6.8  9.2  1.23 7.337 9.091 2.13 -.12 0.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
7.337 9.091 2.13 8.28  8.9  3.71  -.12 0.
GROUP 24. ICNLE
0
GROUP 25. RC
.00146
GROUP 26. TWST,RINC,TINP
0.  0.  0.
GROUP 30. INMM, NARM
      14        1
GROUP 31. ALPO, YIB, YOB, CLCD, PARMF
-0.71     0.5       3.71      0.  0.5
GROUP 32. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 33. CL (INMM-VALUES)
 -0.2144  0.4478  0.7790  0.9657  0.9126  0.9090  0.9056  0.8966  0.9077
  0.9454  1.0474  1.1508  1.2126  1.2397
GROUP 34. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 35. CD (INMM-VALUES)
  0.0093  0.0098  0.0114  0.0132  0.0175  0.0392  0.0535  0.0814  0.1153
  0.1935  0.3111  0.4519  0.5923  0.7291
GROUP 36. XMRF
  0.2500
GROUP 37. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 38 CM (INMM-VALUES)
 -0.0285 -0.0526 -0.0636 -0.0720 -0.0394 -0.0610 -0.0754 -0.1044 -0.1106
 -0.1201 -0.1513 -0.1882 -0.2188 -0.2445
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR H.T.
2 3 3 2 0 0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1 1 1 0 0 0 0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
6 0 0 0 0 0 0 0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
10.5  12.12  0.5  10.947 12.066 1.23  -.31  -5.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
10.947 12.066 1.23 11.5  12  2.13  -.31  -5.
GROUP 24. ICNLE
0
GROUP 25. RC
.00146
GROUP 26. TWST,RINC,TINP
0.  0.  0.
GROUP 30. INMM,NARM
0  0
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR V.T.
```

```
1  6  1  0  0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1  1  1  0  0  1  0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
5  0  0  0  0  0  0  0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
9.8  12.5  0.  11.2  11.9  2.0  .4  90.
GROUP 24. ICNLE
0
GROUP 25. RC
.00146
GROUP 26. TWST,RINC,TINP
0.  0.  0.
GROUP 30. INMM,NARM
0   0
GROUP 39. AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
.1  .56  7.57 2.278 3.71 7.4 0.
GROUP 40. ALNM,SNUM,DVRTX,CLDS
2. 1. 0. 0.
GROUP 41. ALPA
40. 35.
GROUP 42. SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
1.  3.  2.45  1.71  8.  1.23  1.37  1.
GROUP 43. HEIGHT,ATT
0.  0.
GROUP 44. P,BK,RL
0.02 0.08726 0.02
GROUP 45. KF,NT,NCUM,NF,IBY,IBCM
1  2  9  15  1  1
GROUP 46. XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
0.  13.  1.  14. 0.  0.86  0.86  3.5
GROUP 47. ISYM,JSCT
 1   0
GROUP 48. XFF, FUSNO-VALUES
 0.000   0.250   0.500   0.750   1.000   1.250   1.500   1.750   2.000
 2.250   2.500   2.750   3.500  13.000
GROUP 49. RFF
 0.000   0.070   0.135   0.194   0.247   0.296   0.339   0.377   0.410
 0.437   0.460   0.477   0.500   0.500
GROUP 50. XFD FUSNO-VALUES
0.  1.  2.  3.  4.  5.  6.  7.  8.  9.  10.  11.  12.  13.
GROUP 51. FUSELAGE RADII IN SIDE VIEW
0.  .2 .35 .45 .65 .65 .65 .65 .6 .5 .4 .4 .4 .4
GROUP 54. NBCM
6
GROUP 55. XBCM, NBMC-VALUES
0. 3. 5.  7.  10.  13.
GROUP 56. ZBCM
-0.3 -0.12  0.  0.  0.  0.
GROUP 57. IFORB1
  1
GROUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
  0  1  0  0  0
GROUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
  0.  0.  0.  0.25  0
GROUP 60. XORING(I), I=1,6
  0.11  1.32  -0.81  2.05  0.55  0.36
GROUP 69. IWAKE
  0
GROUP 79. LEV
  1
GROUP 80. NSUF,NPC,ICP,MSTW,MITE
  1  0  8  0 8
GROUP 81. ITIPV,MST
  0  0
GROUP 82. MULTIG,XITR
  1  4
GROUP 83. DELTA,DELT,XEND
  0.3  0.55  7.
GROUP 84. NBRR
  0
GROUP 86. DIF1,DIF2
  .5  .5
GROUP 87. NQ1,IREA,ISTAR
  2  0  0
```

```
 **************************************
F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT
 **************************************
GROUP 2. NCASE, NGRD, NSUR
        1         0         3
 **************************************
 CASE NUMBER = 1
 **************************************
 INPUT DATA
GROUP 3. LAT, IBLC, KT, IBD, NLDMM
        1         0         1         1         1
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS
        3         3         3         4         3         0         0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
        1         1         0         0         0         0         0
GROUP 6. DF
  0.000000
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
        6         0         0         0         0         0         0         0
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
  5.250000  9.250000  0.500000  6.800000  9.200000  1.230000 -0.120000  0.000000
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
  6.800000  9.200000  1.230000  7.337000  9.091000  2.130000 -0.120000  0.000000
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
  7.337000  9.091000  2.130000  8.280000  8.900000  3.710000 -0.120000  0.000000
GROUP 24. ICNLE
        0
GROUP 25. RC
  0.001460
GROUP 26. TWST,RINC,TINP
  0.000000  0.000000  0.000000
GROUP 30. INMM, NARM
       14         1
GROUP 31. ALPO, YIB, YOB, CLCD, PARMF
 -0.710000  0.500000  3.710000  0.000000  0.500000
GROUP 32. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.000000  3.000000  6.000000  8.500000  9.500000 11.000000 12.000000 14.000000
 16.000000 20.000000 24.000000 28.000000 32.000000 36.000000
GROUP 33. CL (INMM-VALUES)
 -0.214400  0.447800  0.779000  0.965700  0.912600  0.309000  0.905600  0.896600
  0.907700  0.945400  1.047400  1.150800  1.212600  1.239700
GROUP 34. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.000000  3.000000  6.000000  8.500000  9.500000 11.000000 12.000000 14.000000
 16.000000 20.000000 24.000000 28.000000 32.000000 36.000000
GROUP 35. CD (INMM-VALUES)
  0.009300  0.009800  0.011400  0.013200  0.017500  0.039200  0.053500  0.081400
  0.115300  0.193500  0.311100  0.451900  0.592300  0 729100
GROUP 36. XMRF
  0.250000
GROUP 37. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.000000  3.000000  6.000000  8.500000  9.500000 11.000000 12.000000 14.000000
 16.000000 20.000000 24.000000 28.000000 32.000000 36.000000
GROUP 38 CM (INMM-VALUES)
 -0.028500 -0.052600 -0.063600 -0.072000 -0.039400 -0.061000 -0.075400 -0.104400
 -0.110600 -0.120100 -0.151300 -0.188200 -0.218800 -0.244500
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR H.T.
        2         3         3         2         0         0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
        1         1         1         0         0         0         0
GROUP 6. DF
  0.000000
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
        6         0         0         0         0         0         0         0
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 10.500000 12.120000  0.500000 10.947000 12.066000  1.230000 -0.310000 -5.000000
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 10.947000 12.066000  1.230000 11.500000 12.000000  2.130000 -0.310000 -5.000000
GROUP 24. ICNLE
```

```
        0
GROUP 25. RC
 0.001460
GROUP 26. TWST,RINC,TINP
 0.000000  0.000000  0.000000
GROUP 30. INMM,NARM
        0         0
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR V.T.
        1         6         1         0         0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
        1         1         1         0         0         1         0
GROUP 6. DF
 0.000000
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
        5         0         0         0         0         0         0         0
GROUP 17. IPN
        0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 9.800000 12.500000  0.000000 11.200000 11.900000  2.000000  0.400000 90.000000
GROUP 24. ICNLE
        0
GROUP 25. RC
 0.001460
GROUP 26. TWST,RINC,TINP
 0.000000  0.000000  0.000000
GROUP 30. INMM,NARM
        0         0
GROUP 39. AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
 0.100000  0.560000  7.570000  2.278000  3.710000  7.400000  0.000000
GROUP 40. ALNM,SNUM,DVRTX,CLDS
 2.000000  1.000000  0.000000  0.000000
GROUP 41. ALPA
 40.000000 35.000000
GROUP 42. SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
 1.000000  3.000000  2.450000  1.710000  8.000000  1.230000  1.370000  1.000000
GROUP 43. HEIGHT,ATT
 0.000000  0.000000
GROUP 44. P,BK,RL
 0.020000  0.087260  0.020000
GROUP 45. KF,NT,NCUM,NF,IBY,IBCM
        1         2         9        15         1         1
GROUP 46. XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
 0.000000 13.000000  1.000000 14.000000  0.000000  0.860000  0.860000  3.500000
GROUP 47. ISYM,JSCT
        1         0
GROUP 48. XFF, FUSNO-VALUES
 0.000000  0.250000  0.500000  0.750000  1.000000  1.250000  1.500000  1.750000
 2.000000  2.250000  2.500000  2.750000  3.500000 13.000000
GROUP 49. RFF
 0.000000  0.070000  0.135000  0.194000  0.247000  0.296000  0.339000  0.377000
 0.410000  0.437000  0.460000  0.477000  0.500000  0.500000
GROUP 50. XFD FUSNO-VALUES
 0.000000  1.000000  2.000000  3.000000  4.000000  5.000000  6.000000  7.000000
 8.000000  9.000000 10.000000 11.000000 12.000000 13.000000
GROUP 51. FUSELAGE RADII IN SIDE VIEW
 0.000000  0.200000  0.350000  0.450000  0.650000  0.650000  0.650000  0.650000
 0.600000  0.500000  0.400000  0.400000  0.400000  0.400000
GROUP 54. NBCM
        6
GROUP 55. XBCM, NBMC-VALUES
 0.000000  3.000000  5.000000  7.000000 10.000000 13.000000
GROUP 56. ZBCM
 -0 300000 -0.120000  0.000000  0.000000  0.000000  0.000000
GROUP 57. IFORB1
        1
GROUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
        0         1         0         0         0
GROUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
 0.000000  0.000000  0.000000  0.250000  0.000000
GROUP 60. XCRING(I), I=1,6
 0.110000  1.320000 -0.810000  2.050000  0.550000  0.360000
GROUP 69. IWAKE
        0
GROUP 79. LEV
        1
GROUP 80. NSUF,NPC,ICP,MSTW,MITE
        1         0         8         0         8
GROUP 81. ITIPV,MST
        0         0
GROUP 82. MULTIG,KITR
```

```
        1         4
GROUP 83. DELTA,DELT,XEND
  0.300000  0.550000  7.000000
GROUP 84. NBRR
        0
GROUP 86. DIF1,DIF2
  0.500000  0.500000
GROUP 87. NQ1,IREA,ISTAR
        2         0         0

     HALF SW= 0.75700E+01          CREF= 0.22780E+01

     TOTAL WETTED SURFACE AREA =  75.71376

     SKIN FRICTION COEFFICIENT =   0.02197
 ***************************************
  ANGLE OF ATTACK =  40.000  DEG.
 ***************************************
 exiting invn for lateral

  CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

      X/C       CTIP
   0.01704    0.17934
   0.14645    1.27775
   0.37059    2.31376
   0.62941    2.83469
   0.85355    3.08594
   0.98296    3.15417

  CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

      X/C       CTIP
   0.01704    0.02586
   0.14645    0.18689
   0.37059    0.34349
   0.62941    0.42208
   0.85355    0.45769
   0.98296    0.46703

  CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

      X/C       CTIP
   0.02447    0.00000
   0.20611    0.00000
   0.50000    0.00000
   0.79389    0.00000
   0.97553    0.00000

TIP SUCTION COEFFICIENT =    0.06502  (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION =  -1.52869

     VORTEX-BREAKDOWN CHARACTERISTICS

  ***FOR SURFACE NUMBER  1  ***

      (FOR NONCAMBERED WING)

  CENTROID TO MAX. SUCTION FORCE, YBAR =   0.59214

  TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)=   4.50251

  L.E. LENGTH OF MAX. SUCTION CENTROID =   1.77887

  ALPHA FOR VORTEX BREAKDOWN AT T.E. =  34.30260  DEG.
     (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

  CENTROID TO MAX. SUCTION FORCE, YBAR =   0.25087

  TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)=   1.66469

  L.E. LENGTH OF MAX. SUCTION CENTROID =   0.29213

  ALPHA FOR VORTEX BREAKDOWN AT T.E. =   6.66770  DEG.
     (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

  ***FOR SURFACE NUMBER  2  ***

      (FOR NONCAMBERED WING)
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CENTROID TO MAX. SUCTION FORCE, YBAR =   0.41200

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2) =   0.08629

L.E. LENGTH OF MAX. SUCTION CENTROID =   0.64508

ALPHA FOR VORTEX BREAKDOWN AT T.E. =  11.40292  DEG.
   (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

***FOR SURFACE NUMBER  3  ***

   (FOR NONCAMBERED WING)

   VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER  1  ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID =   1.17652

ALPHA FOR VORTEX BREAKDOWN AT T.E. =  21.60469  DEG.
   (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

L.E. LENGTH OF MAX. SUCTION CENTROID =   0.27870

ALPHA FOR VORTEX BREAKDOWN AT T.E. =   6.09642  DEG.
   (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

***FOR SURFACE NUMBER  2  ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID =   0.46029

ALPHA FOR VORTEX BREAKDOWN AT T.E. =   7.55154  DEG.
   (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

***FOR SURFACE NUMBER  3  ***

   (FOR NONCAMBERED WING)

   VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER  1  ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID =   2.19302

ALPHA FOR VORTEX BREAKDOWN AT T.E. =  41.46409  DEG.
   (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

L.E. LENGTH OF MAX. SUCTION CENTROID =   0.30939

ALPHA FOR VORTEX BREAKDOWN AT T.E. =   7.40696  DEG.
   (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  2  ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID =   0.68422

ALPHA FOR VORTEX BREAKDOWN AT T.E. =  13.42699  DEG.
   (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  3  ***

   (FOR NONCAMBERED WING)
*******************************************
***THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E.HAVE BEEN CORRECTED FOR
        CAMBER AND ADVERSE PRESSURE GRADIENT IN VORTEX LIFT AUGMENTATION, IF ANY***

***FOR SURFACE NUMBER  1  ***

REVISED ALPHA BDTE =   19.052  DEG.
   (FOR SYMMETRICAL LOADING)
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REVISED ALPHA BDTE =     6.354  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    26.213  DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE =     6.668  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     6.096  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =     7.407  DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  2  ***

REVISED ALPHA BDTE =    11.403  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     7.552  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    13.427  DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  3  ***

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR LEFT WING IN SIDESLIP)
*************************************
ANGLE OF ATTACK =  35.000  DEG.
*************************************

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

   X/C       CTIP
 0.01704   0.05598
 0.14645   0.39614
 0.37059   0.71203
 0.62941   0.86595
 0.85355   0.93828
 0.98296   0.95765

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

   X/C       CTIP
 0.01704   0.05187
 0.14645   0.37445
 0.37059   0.68692
 0.62941   0.84243
 0.85355   0.91227
 0.98296   0.93039

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

   X/C       CTIP
 0.02447   0.00000
 0.20611   0.00000
 0.50000   0.00000
 0.79389   0.00000
 0.97553   0.00000

TIP SUCTION COEFFICIENT =   0.02957  (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION =  -2.46698

***FOR SURFACE NUMBER  1  ***

REVISED ALPHA BDTE =    19.052  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     6.354  DEG.
   (FOR RIGHT WING IN SIDESLIP)
```

```
REVISED ALPHA BDTE =    26.213  DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE =     6.668  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     6.096  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =     7.407  DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  2  ***

REVISED ALPHA BDTE =    11.403  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     7.552  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    13.427  DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  3  ***

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR LEFT WING IN SIDESLIP)
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  1
NUMBER OF ITERATIONS =   7

LOCATION OF VORTEX BREAKDOWN AT X-COORDINATE =   5.70038

LOCATION OF VORTEX BREAKDOWN AT X-COORDINATE =   6.21802
   (FOR THE LEFT SIDE)
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  2
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  3
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  4
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  5
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  6
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  7
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  8
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF  9
 NONLINEAR SECTION DATA ARE BEING USED AT THE STRIP NOOF 10

                 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

                 PRESSURE DISTRIBUTION AT ALPHA =  35.000  DEG.

                          WITHOUT VORTEX FLOW EFFECT

                 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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VORTEX	XV	YV	CP
1	0.01704	0.16359	3.07867
2	0.14645	0.16359	1.35120
3	0.37059	0.16359	1.01833
4	0.62941	0.16359	0.58863
5	0.85355	0.16359	0.25679
6	0.98296	0.16359	0.07268
7	0.01704	0.23315	3.76970
8	0.14645	0.23315	1.49608
9	0.37059	0.23315	1.02116
10	0.62941	0.23315	0.58903
11	0.85355	0.23315	0.27374
12	0.98296	0.23315	0.08037
13	0.01704	0.30272	4.58626
14	0.14645	0.30272	1.90418
15	0.37059	0.30272	0.98304
16	0.62941	0.30272	0.55180
17	0.85355	0.30272	0.27380
18	0.98296	0.30272	0.08207
19	0.01704	0.36706	6.16612
20	0.14645	0.36706	1.78501

21	0.37059	0.36706	0.92456
22	0.62941	0.36706	0.52989
23	0.85355	0.36706	0.27108
24	0.98296	0.36706	0.08293
25	0.01704	0.45283	5.99214
26	0.14645	0.45283	1.84959
27	0.37059	0.45283	0.94961
28	0.62941	0.45283	0.53458
29	0.85355	0.45283	0.27680
30	0.98296	0.45283	0.08638
31	0.01704	0.53860	5.96463
32	0.14645	0.53860	1.86214
33	0.37059	0.53860	0.96681
34	0.62941	0.53860	0.54440
35	0.85355	0.53860	0.28287
36	0.98296	0.53860	0.08836
37	0.01704	0.61479	5.96186
38	0.14645	0.61479	1.88192
39	0.37059	0.61479	0.98194
40	0.62941	0.61479	0.55318
41	0.85355	0.61479	0.28727
42	0.98296	0.61479	0.08953
43	0.01704	0.72126	5.96619
44	0.14645	0.72126	1.90764
45	0.37059	0.72126	0.99934
46	0.62941	0.72126	0.55868
47	0.85355	0.72126	0.28823
48	0.98296	0.72126	0.08944
49	0.01704	0.85286	6.05277
50	0.14645	0.85286	1.91101
51	0.37059	0.85286	0.96814
52	0.62941	0.85286	0.51788
53	0.85355	0.85286	0.26154
54	0.98296	0.85286	0.08074
55	0.01704	0.95933	6.03498
56	0.14645	0.95933	1.63109
57	0.37059	0.95933	0.63841
58	0.62941	0.95933	0.30290
59	0.85355	0.95933	0.15374
60	0.98296	0.95933	0.04895
61	0.01704	0.28493	3.05433
62	0.14645	0.28493	1.21253
63	0.37059	0.28493	0.73738
64	0.62941	0.28493	0.43090
65	0.85355	0.28493	0.20830
66	0.98296	0.28493	0.04942
67	0.01704	0.40610	4.13529
68	0.14645	0.40610	1.38993
69	0.37059	0.40610	0.78926
70	0.62941	0.40610	0.45746
71	0.85355	0.40610	0.23028
72	0.98296	0.40610	0.06685
73	0.01704	0.52727	5.10791
74	0.14645	0.52727	1.62953
75	0.37059	0.52727	0.86980
76	0.62941	0.52727	0.49065
77	0.85355	0.52727	0.25078
78	0.98296	0.52727	0.07870
79	0.01704	0.63934	5.99722
80	0.14645	0.63934	1.85194
81	0.37059	0.63934	0.95872
82	0.62941	0.63934	0.53209
83	0.85355	0.63934	0.27766
84	0.98296	0.63934	0.09830
85	0.01704	0.78873	6.68066
86	0.14645	0.78873	2.07365
87	0.37059	0.78873	1.03424
88	0.62941	0.78873	0.55733
89	0.85355	0.78873	0.29813
90	0.98296	0.78873	0.12292
91	0.01704	0.93812	6.58169
92	0.14645	0.93812	1.85147
93	0.37059	0.93812	0.79350
94	0.62941	0.93812	0.43454
95	0.85355	0.93812	0.27980
96	0.98296	0.93812	0.17467
97	0.02447	0.04952	0.00000
98	0.20611	0.04952	0.00000
99	0.50000	0.04952	0.00000
100	0.79389	0.04952	0.00000

101	0.97553	0.04952	0.00000
102	0.02447	0.18826	0.00000
103	0.20611	0.18826	0.00000
104	0.50000	0.18826	0.00000
105	0.79389	0.18826	0.00000
106	0.97553	0.18826	0.00000
107	0.02447	0.38874	0.00000
108	0.20611	0.38874	0.00000
109	0.50000	0.38874	0.00000
110	0.79389	0.38874	0.00000
111	0.97553	0.38874	0.00000
112	0.02447	0.61126	0.00000
113	0.20611	0.61126	0.00000
114	0.50000	0.61126	0.00000
115	0.79389	0.61126	0.00000
116	0.97553	0.61126	0.00000
117	0.02447	0.81174	0.00000
118	0.20611	0.81174	0.00000
119	0.50000	0.81174	0.00000
120	0.79389	0.81174	0.00000
121	0.97553	0.81174	0.00000
122	0.02447	0.95048	0.00000
123	0.20611	0.95048	0.00000
124	0.50000	0.95048	0.00000
125	0.79389	0.95048	0.00000
126	0.97553	0.95048	0.00000

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
0.16359	0.87909	0.87909	0.26407	0.23138	0.65510	1.74324	0.00000
0.23315	1.00192	1.00192	0.02619	0.32061	0.75682	1.40959	0.00000
0.30272	1.17395	1.17395	-0.19177	0.46331	0.90174	1.71679	0.00000
0.36706	1.21586	1.21586	-0.30066	0.46023	0.92997	0.43584	0.00000
0.45283	1.21141	1.21141	-0.34023	0.42330	0.92111	0.35851	0.00000
0.53860	1.21497	1.21497	-0.38772	0.41794	0.92266	0.31469	0.00000
0.61479	1.21989	1.21989	-0.43189	0.41638	0.92567	0.27904	0.00000
0.72126	1.22594	1.22594	-0.49192	0.41636	0.92973	0.23096	0.00000
0.85286	1.22283	1.22283	-0.55593	0.43008	0.93009	0.17771	0.00000
0.95933	1.06056	1.06056	-0.51184	0.44144	0.81881	0.13160	0.00000

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.28493	0.68226	0.68226	-1.19300	0.09575	0.49419	0.00000	0.00000
0.40610	0.84085	0.84085	-1.41790	0.18563	0.62069	0.00000	0.00000
0.52727	1.01610	1.01610	-1.67568	0.28684	0.76080	0.00000	0.00000
0.63934	1.18081	1.18081	-1.93011	0.38347	0.89275	0.00000	0.00000
0.78873	1.34579	1.34579	-2.19647	0.49318	1.02714	0.00000	0.00000
0.93812	1.22876	1.22876	-2.01592	0.48782	0.94427	0.00000	0.00000

*** TAIL SURFACE 2 ***

0.04952	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.18826	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.38874	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.61126	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.81174	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.95048	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

*** THE FOLLOWING ARE RESULTS WITHOUT VORTEX FLOW EFFECT ***

TOTAL LIFT COEFFICIENT = 1.08469

TOTAL INDUCED DRAG COEFFICIENT = 0.82164

THE INDUCED DRAG PARAMETER = 0.69835

TOTAL PITCHING MOMENT COEFFICIENT = -0.54618

THE WING LIFT COEFFICIENT = 0.86547

THE WING INDUCED DRAG COEFFICIENT = 0.65715

THE WING PITCHING MOMENT COEFFICIENT = -0.18189

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.21922 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.16449 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = -0.36429

*** TAIL SURFACE 2 ***

THE TAIL LIFT COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 8.6 THETA 2= 25.9 THETA 3= 43.1 THETA 4= 60.4 THETA 5= 77.6
THETA 6= 94.9 THETA 7=116.2 THETA 8=141.7 THETA 9=167.2 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA 9	I-E
-0.56649	0.25073	0.10129	-0.13862	-0.37238	-0.50083	-0.45861	-0.16527	0.36515	0.76389	
-0.54476	0.00453	-0.15214	-0.40184	-0.64045	-0.76145	-0.69542	-0.35219	0.24811	0.69433	
-0.50224	-0.02069	-0.20422	-0.49906	-0.78685	-0.94605	-0.89650	-0.54000	0.10679	0.59350	
-0.44080	0.02598	-0.15339	-0.44366	-0.73242	-0.90383	-0.88059	-0.57344	0.00760	0.45013	
-0.36312	0.14374	-0.04208	-0.34586	-0.65597	-0.85665	-0.86933	-0.61136	-0.08401	0.32601	
-0.27260	0.25597	0.05997	-0.26272	-0.59774	-0.82595	-0.86548	-0.63613	-0.13313	0.26450	
-0.17319	0.34949	0.15929	-0.15830	-0.49879	-0.75002	-0.81081	-0.54454	-0.10099	0.23381	
-0.06923	0.19255	0.09886	-0.04305	-0.14905	-0.12017	0.06695	0.23330	0.26252	0.33880	
0.03473	0.18408	0.12824	0.04913	-0.00936	-0.03673	-0.12367	0.47286	0.36390	0.41326	
0.13414	0.25061	0.21696	0.17409	0.15726	0.19008	0.24600	0.28932	0.31305	0.36737	
0.22466	0.28404	0.23615	0.16628	0.11357	0.11079	0.15083	0.16422	0.24812	0.31946	
0.30234	0.27002	0.24207	0.20330	0.17682	0.17383	0.17984	0.23621	0.32584	0.33869	
0.36378	0.28875	0.26872	0.24593	0.24240	0.26569	0.29335	0.30897	0.32927	0.34902	
0.40630	0.32801	0.30910	0.28701	0.28151	0.29867	0.31663	0.31107	0.30573	0.31901	
0.42803	-0.17770	-0.14426	-0.06957	0.05206	0.20981	0.36521	0.50434	0.62021	0.69399	

X0 = 0.7492560896941104

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ONLOCAL RADIUS

X/L	RADIUS	LOADING
0.00274	0.00997	0.84114
0.02447	0.08771	1.11009
0.06699	0.21962	1.00186
0.12843	0.36477	0.70912
0.20611	0.47220	0.33106
0.29663	0.50000	0.05693
0.39604	0.50000	-0.10292
0.50000	0.50000	0.48354
0.60396	0.50000	0.59988
0.70337	0.50000	0.24968
0.79389	0.50000	0.10497
0.87157	0.50000	0.16771
0.93301	0.50000	0.13782
0.97553	0.50000	0.01814
0.99726	0.50000	0.00907

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = 0.09830

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = 0.07369

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.04801
(NOTE. BASE DRAG IS NOT INCLUDED)

THE FOLLOWING VALUES ARE OBTAINED BY IGNORING
THE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

THE FUSELAGE LIFT COEFFICIENT = 0.08661

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   THE FUSELAGE MOMENT COEFFICIENT =  0.09461

   THE FUSELAGE INDUCED DRAG COEFFICIENT =  0.04281

   FUSELAGE VORTEX LIFT =

   CLVF =  0.11789  CDVF =  0.07213  CMVF =  0.06397
 ***********************************************
 *         RESULTS FROM FOREBODY               *
 ***********************************************
 ALPHAE =  27.44475069044070    CLFP= 4.2436628399429279E-02BASE AREA=
  0.7853981852531433

************SUMMARY OF FOREBODY INFO**************

THE TOTAL FORCE AND MOMENT AT ANGLE OF ATTACK   27.445FOR BRANCH  1  ARE
TOTAL NORMAL FORCE COEFFICIENT DUE TO VORTEX=  0.062486
TOTAL  SIDE  FORCE COEFFICIENT DUE TO VORTEX=  0.038890
TOTAL   LIFT      COEFFICIENT DUE TO VORTEX=  0.055454
TOTAL  DRAG  FORCE COEFFICIENT DUE TO VORTEX=  0.028799
TOTAL YAWING MOMENT COEFFICIENT DUE TO VORTEX=  0.066580
TOTAL PITCHING MOMENT COEFFICIENT DUE TO VORTEX=  0.106978


 ************** END OF FOREBODY ***************
 ILMAX,ILFOR,ILAFT           45          35          11
 (X, Y AND Z-COORDINATES)
    THE RIGHT-SIDE FOREBODY VORTEX LOCATIONS
     3.50000     4.80000     6.10000     7.40000     8.70000    10.00000    11.30000    12.60000
    13.90000    15.20000    16.50000
    -0.06606    -0.06606    -0.06606    -0.06606    -0.06606    -0.06606    -0.06606    -0.06606
    -0.06606    -0.06606    -0.06606
     0.91151     0.91151     0.91151     0.91151     0.91151     0.91151     0.91151     0.91151
     0.91151     0.91151     0.91151
    THE LEFT-SIDE FOREBODY VORTEX LOCATIONS
     3.50000     4.80000     6.10000     7.40000     8.70000    10.00000    11.30000    12.60000
    13.90000    15.20000    16.50000
    -0.63641    -0.63641    -0.63641    -0.63641    -0.63641    -0.63641    -0.63641    -0.63641
    -0.63641    -0.63641    -0.63641
     1.34985     1.34985     1.34985     1.34985     1.34985     1.34985     1.34985     1.34985
     1.34985     1.34985     1.34985
 X0 =  0.8312200000000000
 XC =  0.8294956163370914
 XC =  0.8294956163370914
  CNB FROM L.S.=   0.03168 FUSELAGE CNB =   0.15570
  CYB FROM L.S. =  -0.27892 FUSELAGE CYB =   0.25477
 X0 =  0.8312200000000000
 *************************************

  SUMMARY OF RESULTS WITHOUT VORTEX FLOW EFFECT AT ALPHA = 35.000  DEG.  M =  0.100
 *************************************

   CL(LS) =   1.08469   CLF =   0.09550   CL =   1.18019

   CDI(LS)=  0.82164   CDF =  0.04281   CDVIS =  0.25197   CD =  1.11642

   CM(LS) =  -0.54618   CMF =   0.09461   CM =  -0.45157
 *************************************
 *************************************

  THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

  CLP =   0.93873   CLVLE =   0.18747   CLVSE =   0.00613   CLVAUG =   0.15329

  CDP =  0.52985  CDVLE =  0.13127  CDVSE =  0.00429  CDVAUG =  0.10733  CDDVP =  0.00000

  CMP =  -0.54618   CMVLE =   0.09761   CMVSE =  -0.00811   CMVAUG =  -0.04037

  CLDVP =   0.00000  CLDVV =   0.00000  CLF =   0.14206  CL =   1.42768

  CDDVV =   0.00000  CDF =   0.07161  CDVIS =   0.25197  CD =   1.09533

  CMDVP =   0.00000  CMDVV =   0.00000  CMF =   0.20159  CM =  -0.29546

  CAXP =   0.00000   CAXV =   0.00000
 *************************************

  THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
     A REFERENCE SPAN OF    7.42000  AND A REFERENCE AREA OF  15.14000
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PBAR =   0.02000  BETA =   0.08726
**************************************

*STABILITY DERIVATIVES WITHOUT VORTEX FLOW EFFECT*
**************************************


***STABILITY DERIVATIVES EVALUATED AT ALPHA =  35.000  DEGREES
   AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

   CYB =  -0.0241548  CLB =  -0.0835848  CNB =   0.1873788

   CYP =   0.0744516  CLP =  -0.0670100  CNP =   0.0088314

   CYR =   1.1687699  CLR =   0.1889360  CNR =  -0.4529791

***STABILITY DERIVATIVES BASED ON STABILITY AXES***

   CYB =  -0.0241548  CLB =   0.0390075  CNB =   0.2014340

   CYP =   0.7313660  CLP =  -0.1010696  CNP =  -0.2375782

   CYR =   0.9146966  CLR =  -0.0574737  CNR =  -0.4189194
**************************************

*STABILITY DERIVATIVES WITH EDGE VORTEX SEPARATION*
**************************************


***STABILITY DERIVATIVES EVALUATED AT ALPHA =  35.000  DEGREES
   AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

   **INCLUDING THE EFFECT OF LE AND SE VORTEX LIFT*

   CYB =  -0.3442427  CLB =  -0.0909084  CNB =   0.1554419

   CYP =  -0.0653701  CLP =  -0.1688111  CNP =   0.0345748

   CYR =   1.0361483  CLR =   0.1656674  CNR =  -0.4507952

***STABILITY DERIVATIVES BASED ON STABILITY AXES***

   CYB =  -0.3442427  CLB =   0.0146900  CNB =   0.1794734

   CYP =   0.5407622  CLP =  -0.1674980  CNP =  -0.1637921

   CYR =   0.8862978  CLR =  -0.0326995  CNR =  -0.4521084

***STABILITY DERIVATIVES EVALUATED AT ALPHA =  35.000  DEGREES
   AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

   *INCLUDING THE EFFECT OF LE VORTEX LIFT*

   CYB =  -0.3670403  CLB =  -0.0908093  CNB =   0.1593976

   CYP =   0.0489878  CLP =  -0.1452523  CNP =   0.0152883

   CYR =   1.0223413  CLR =   0.1638673  CNR =  -0.4485518

***STABILITY DERIVATIVES BASED ON STABILITY AXES***

   CYB =  -0.3670403  CLB =   0.0170401  CNB =   0.1826569

   CYP =   0.6265193  CLP =  -0.1608592  CNP =  -0.1861563

   CYR =   0.8093548  CLR =  -0.0375772  CNR =  -0.4329449

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
            WHERE S =  15.14000  AND B/2 =   3.71000
         (WITHOUT VORTEX FLOW EFFECT)
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Y/S	BM(RIGHT)	BM(LEFT)
0.16359	0.13562	0.13562
0.23315	0.10866	0.10866
0.30272	0.08574	0.08574

0.36706	0.06738	0.06738
0.45283	0.04684	0.04684
0.53860	0.03115	0.03115
0.61479	0.02015	0.02015
0.72126	0.00915	0.00915
0.85286	0.00203	0.00203
0.95933	0.00007	0.00007

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.147850 (RIGHT), = 0.147850 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.13000

*** TAIL SURFACE 1 ***

0.29493	0.03456	0.03456
0.40610	0.02303	0.02303
0.52727	0.01402	0.01402
0.63934	0.00763	0.00763
0.78873	0.00213	0.00213
0.93812	0.00014	0.00014

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.039939 (RIGHT), = 0.039939 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.00000

*** TAIL SURFACE 2 ***

0.04952	0.00000	0.00000
0.18826	0.00000	0.00000
0.38874	0.00000	0.00000
0.61126	0.00000	0.00000
0.81174	0.00000	0.00000
0.95048	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000000 (RIGHT), = 0.000000 (LEFT)

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 15.14000 AND B/2 = 3.71000
(FOR VORTEX FLOW)

Y/S	BM(RIGHT)	BM(LEFT)
0.16359	0.14417	0.14417
0.23315	0.11662	0.11662
0.30272	0.09278	0.09278
0.36706	0.07347	0.07347
0.45283	0.05153	0.05153
0.53860	0.03447	0.03447
0.61479	0.02243	0.02243
0.72126	0.01028	0.01028
0.85286	0.00231	0.00231
0.95933	0.00008	0.00008

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.156480 (RIGHT), = 0.156480 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.13000

*** TAIL SURFACE 1 ***

0.28493	0.04634	0.04634
0.40610	0.03127	0.03127
0.52727	0.01922	0.01922
0.63934	0.01054	0.01054
0.78873	0.00297	0.00297
0.93812	0.00019	0.00019

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.053262 (RIGHT), = 0.053262 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.00000

*** TAIL SURFACE 2 ***

0.04952	0.00000	0.00000
0.18826	0.00000	0.00000
0.38874	0.00000	0.00000
0.61126	0.00000	0.00000
0.81174	0.00000	0.00000
0.95048	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000000 (RIGHT), = 0.000000 (LEFT)

exiting invn for lateral

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.18709
0.14645	0.72548
0.37059	0.78059
0.62941	0.82233
0.85355	0.80701
0.98296	0.82449

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.06395
0.14645	0.46129
0.37059	0.84479
0.62941	1.03413
0.85355	1.11851
0.98296	1.14022

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00512
0.20611	0.02490
0.50000	0.03161

0.79389	0.03335
0.97553	0.03326

TIP SUCTION COEFFICIENT = 0.03418 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -2.60059

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.38736
0.14645	1.31272
0.37059	1.11799
0.62941	1.03782
0.85355	0.96068
0.98296	0.97048

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.05949
0.14645	0.42965
0.37059	0.78841
0.62941	0.96696
0.85355	1.04703
0.98296	1.06771

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00512
0.20611	0.02490
0.50000	0.03161
0.79389	0.03335
0.97553	0.03326

TIP SUCTION COEFFICIENT = 0.04089 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -2.28400

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 35.000 DEG.

AT ITERATION NUMBER = 7

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

*** THE FOLLOWING ARE RESULTS WITHOUT VORTEX BREAKDOWN ***

VORTEX	XV	YV	CP (LEFT)	CP (RIGHT)
1	0.01254	0.16359	6.49743	8.50555
2	0.10908	0.16359	3.56266	6.58374
3	0.28306	0.16359	2.06115	3.28579
4	0.50000	0.16359	2.16421	2.67658
5	0.71694	0.16359	0.69933	0.89124
6	0.89092	0.16359	0.78194	0.81015
7	0.98746	0.16359	0.11430	0.18399
8	0.01254	0.23315	6.58364	6.85571
9	0.10908	0.23315	5.11701	6.81841
10	0.28306	0.23315	3.64405	4.95486
11	0.50000	0.23315	1.79379	2.92600
12	0.71694	0.23315	1.08851	1.59901
13	0.89092	0.23315	0.48722	0.63628
14	0.98746	0.23315	0.34554	0.51166
15	0.01254	0.30272	6.97140	7.72209
16	0.10908	0.30272	5.49447	7.20674
17	0.28306	0.30272	4.27158	5.46484
18	0.50000	0.30272	2.19078	3.41590
19	0.71694	0.30272	1.07633	1.86351
20	0.89092	0.30272	0.45894	0.71721
21	0.98746	0.30272	0.32332	0.63245
22	0.01254	0.36706	6.72918	0.55650
23	0.10908	0.36706	5.51822	7.40322
24	0.28306	0.36706	4.32546	5.36675
25	0.50000	0.36706	2.73526	3.68926
26	0.71694	0.36706	1.69825	2.38052
27	0.89092	0.36706	0.91769	1.21516
28	0.98746	0.36706	0.81092	1.35750
29	0.01254	0.45283	3.95810	5.08646

30	0.10908	0.45283	3.67166	5.02587
31	0.28306	0.45283	3.33946	4.01784
32	0.50000	0.45283	2.67580	3.10907
33	0.71694	0.45283	2.11718	2.44119
34	0.89092	0.45283	1.43246	1.83727
35	0.98746	0.45283	1.59953	2.22135
36	0.01254	0.53860	2.53488	2.83567
37	0.10908	0.53860	2.46302	3.46067
38	0.28306	0.53860	2.34473	2.82036
39	0.50000	0.53860	2.00122	2.05672
40	0.71694	0.53860	1.90887	1.74134
41	0.89092	0.53860	1.75249	1.77297
42	0.98746	0.53860	2.02924	2.38897
43	0.01254	0.61479	2.32574	2.39784
44	0.10908	0.61479	2.11633	2.36945
45	0.28306	0.61479	1.71513	1.80675
46	0.50000	0.61479	1.42899	1.33046
47	0.71694	0.61479	1.32880	1.05742
48	0.89092	0.61479	1.43348	1.13234
49	0.98746	0.61479	1.82865	1.70455
50	0.01254	0.72126	1.76713	1.70795
51	0.10908	0.72126	1.55244	1.74631
52	0.28306	0.72126	1.07210	1.14162
53	0.50000	0.72126	0.99955	0.89300
54	0.71694	0.72126	0.87660	0.65738
55	0.89092	0.72126	0.98501	0.69168
56	0.98746	0.72126	1.23766	0.93304
57	0.01254	0.85286	2.34402	1.99522
58	0.10908	0.85286	1.40250	1.66478
59	0.28306	0.85286	0.79706	0.70468
60	0.50000	0.85286	0.65819	0.56247
61	0.71694	0.85286	0.51702	0.32306
62	0.89092	0.85286	0.52724	0.32995
63	0.98746	0.85286	0.60412	0.31892
64	0.01254	0.95933	2.70763	1.90367
65	0.10908	0.95933	1.32746	1.22892
66	0.28306	0.95933	0.74101	0.41978
67	0.50000	0.95933	0.66109	0.34483
68	0.71694	0.95933	0.61076	0.19165
69	0.89092	0.95933	0.61960	0.21182
70	0.98746	0.95933	0.67339	0.17157
71	0.01704	0.28493	4.19953	4.13173
72	0.14645	0.28493	1.66587	1.64569
73	0.37059	0.28493	1.02699	1.02018
74	0.62941	0.28493	0.62214	0.63855
75	0.85355	0.28493	0.30843	0.33505
76	0.98296	0.28493	0.06595	0.09246
77	0.01704	0.40610	4.94998	4.93425
78	0.14645	0.40610	1.72229	1.71627
79	0.37059	0.40610	1.00599	1.01470
80	0.62941	0.40610	0.59797	0.62211
81	0.85355	0.40610	0.29664	0.32983
82	0.98296	0.40610	0.06025	0.09816
83	0.01704	0.52727	5.36850	5.55791
84	0.14645	0.52727	1.76696	1.83718
85	0.37059	0.52727	0.97582	1.02982
86	0.62941	0.52727	0.55146	0.60721
87	0.85355	0.52727	0.29641	0.31697
88	0.98296	0.52727	0.02519	0.09043
89	0.01704	0.63934	5.72548	6.12482
90	0.14645	0.63934	1.84108	1.97066
91	0.37059	0.63934	0.97392	1.05418
92	0.62941	0.63934	0.52822	0.59586
93	0.85355	0.63934	0.23403	0.30194
94	0.98296	0.63934	0.00921	0.08033
95	0.01704	0.78873	6.13521	6.81916
96	0.14645	0.78873	1.90177	2.12442
97	0.37059	0.78873	0.90510	1.04900
98	0.62941	0.78873	0.40814	0.53630
99	0.85355	0.78873	0.11960	0.24722
100	0.98296	0.78873	-0.08400	0.04513
101	0.01704	0.93812	5.80397	6.69832
102	0.14645	0.93812	1.42520	1.78906
103	0.37059	0.93812	0.33157	0.64285
104	0.62941	0.93812	-0.08766	0.23684
105	0.85355	0.93812	-0.27319	0.06222
106	0.98296	0.93812	-0.39081	-0.05301
107	0.02447	0.04952	0.03118	0.03118
108	0.20611	0.04952	0.00037	0.00037
109	0.50000	0.04952	0.00178	0.00178

110	0.79389	0.04952	-0.00298	-0.00298
111	0.97553	0.04952	-0.00206	-0.00206
112	0.02447	0.18826	0.04848	0.04848
113	0.20611	0.18826	0.00295	0.00295
114	0.50000	0.18826	0.00031	0.00031
115	0.79389	0.18826	-0.00031	-0.00031
116	0.97553	0.18826	-0.00047	-0.00047
117	0.02447	0.38874	0.05887	0.05887
118	0.20611	0.38874	0.00211	0.00211
119	0.50000	0.38874	-0.00003	-0.00003
120	0.79389	0.38874	0.00006	0.00006
121	0.97553	0.38874	0.00007	0.00007
122	0.02447	0.61126	0.08270	0.08270
123	0.20611	0.61126	0.00287	0.00287
124	0.50000	0.61126	-0.00007	-0.00007
125	0.79389	0.61126	-0.00047	-0.00047
126	0.97553	0.61126	-0.00065	-0.00065
127	0.02447	0.81174	0.11540	0.11540
128	0.20611	0.81174	0.00529	0.00529
129	0.50000	0.81174	-0.00015	-0.00015
130	0.79389	0.81174	-0.00201	-0.00201
131	0.97553	0.81174	-0.00277	-0.00277
132	0.02447	0.95048	0.13724	0.13724
133	0.20611	0.95048	0.01075	0.01075
134	0.50000	0.95048	-0.00325	-0.00325
135	0.79389	0.95048	-0.00740	-0.00740
136	0.97553	0.95048	-0.00898	-0.00898

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI
0.16359	2.40619	1.64294	0.86367	0.03414	1.42348
0.23315	2.80210	2.06235	0.52420	0.04032	1.71000
0.30272	3.11934	2.29696	0.02869	0.04862	1.90463
0.36706	3.06648	2.58567	-0.45308	0.06843	1.99061
0.45283	2.76429	2.24546	-0.68208	0.06557	1.76521
0.53860	1.98443	1.77949	-0.68065	0.06514	1.32896
0.61479	1.32533	1.38084	-0.52948	0.06501	0.95862
0.72126	0.88682	0.95747	-0.39923	0.06501	0.65687
0.85286	0.63478	0.71828	-0.30756	0.06610	0.48508
0.95933	0.45307	0.74526	-0.31103	0.06699	0.43106

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.28493	0.88094	0.90472	-1.68397	0.03010	0.62977
0.40610	0.93436	0.95541	-1.80951	0.04257	0.66796
0.52727	0.98651	0.97307	-1.91038	0.05331	0.69389
0.63934	1.03836	1.00250	-2.03180	0.06186	0.72429
0.78873	1.07226	0.98534	-2.10236	0.07036	0.73213
0.93812	0.81822	0.61382	-1.46261	0.06996	0.51358

*** TAIL SURFACE 2 ***

0.04952	0.00223	0.00223	0.00000	0.00000	0.00000
0.18826	0.00445	0.00445	0.00000	0.00000	0.00000
0.38874	0.00513	0.00513	0.00000	0.00000	0.00000
0.61126	0.00701	0.00701	0.00000	0.00000	0.00000
0.81174	0.00960	0.00960	0.00000	0.00000	0.00000
0.95048	0.01006	0.01006	0.00000	0.00000	0.00000

TOTAL LIFT COEFFICIENT = 1.69221

TOTAL INDUCED DRAG COEFFICIENT = 1.19336

TOTAL PITCHING MOMENT COEFFICIENT = -0.48670

THE WING LIFT COEFFICIENT = 1.48644

THE WING INDUCED DRAG COEFFICIENT = 1.04821

THE WING PITCHING MOMENT COEFFICIENT = -0.08516

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.20453 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.14515 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = -0.40154

*** TAIL SURFACE 2 ***

THE TAIL LIFT COEFFICIENT = 0.00124 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 8.6 THETA 2= 25.9 THETA 3= 43.1 THETA 4= 60.4 THETA 5= 77.6
THETA 6= 94.9 THETA 7=116.2 THETA 8=141.7 THETA 9=167.2 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA 9	THET
-0.56649	0.16857	-0.04575	-0.30547	-0.50357	-0.55070	-0.40835	-0.01642	0.52804	0.81537	
-0.54476	-0.08684	-0.31117	-0.57981	-0.77740	-0.80823	-0.63224	-0.18171	0.43178	0.75307	
-0.50224	-0.12630	-0.39091	-0.71144	-0.95619	-1.01935	-0.84178	-0.36213	0.30436	0.65570	
-0.44080	-0.08097	-0.34119	-0.66010	-0.91180	-0.99073	-0.85039	-0.42447	0.18079	0.50235	
-0.36312	0.02611	-0.24618	-0.58491	-0.86369	-0.97584	-0.87266	-0.49447	0.06422	0.36479	
-0.27260	0.11369	-0.17656	-0.54072	-0.84737	-0.98524	-0.90263	-0.54738	-0.00972	0.27885	
-0.17319	0.13523	-0.13951	-0.49664	-0.82481	-1.00788	-0.99893	-0.62307	-0.15057	0.01579	
-0.06923	-0.81265	-0.91045	-1.14099	-1.60367	-1.76786	-1.18981	-0.19051	-0.01566	-0.04824	
0.03473	-0.52925	-0.53260	-0.56060	-0.57983	-0.52456	-1.12378	0.49498	0.38976	0.38269	
0.13414	-0.27492	-0.25199	-0.20509	-0.11971	-0.00700	0.06597	0.25625	0.31594	0.37626	
0.22466	0.04785	0.02624	0.01614	0.00212	-0.02523	-0.04975	0.03663	0.22666	0.26829	
0.30234	0.02332	0.03947	0.04657	0.04603	0.03925	0.04196	0.14383	0.28950	0.27090	
0.36378	0.08396	0.11944	0.15157	0.17915	0.20823	0.24259	0.30100	0.33461	0.30340	
0.40630	0.22838	0.31190	0.37554	0.41824	0.44601	0.46047	0.46383	0.40037	0.27404	
0.42803	-1.34003	-0.96807	-0.51693	-0.06464	0.32952	0.62864	0.86694	0.96538	0.95829	

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA10=351.4 THETA11=334.1 THETA12=316.9 THETA13=299.6 THETA14=282.4
THETA15=265.1 THETA16=243.8 THETA17=218.3 THETA18=192.8 THETA

X/L	THETA10	THETA11	THETA12	THETA13	THETA14	THETA15	THETA16	THETA17	THETA18	THET
-0.56649	0.25186	0.17093	-0.04296	-0.30535	-0.50911	-0.56346	-0.36836	0.14437	0.65080	
-0.54476	0.00066	-0.08454	-0.30865	-0.58046	-0.78451	-0.82354	-0.58558	-0.00060	0.56859	
-0.50224	-0.02312	-0.12236	-0.38572	-0.70932	-0.96140	-1.03024	-0.79332	-0.16652	0.45364	
-0.44080	0.01994	-0.07741	-0.33633	-0.65765	-0.91549	-1.00281	-0.80772	-0.24668	0.31780	
-0.36312	0.13113	0.02993	-0.24063	-0.58113	-0.86518	-0.98459	-0.83601	-0.33056	0.19274	
-0.27260	0.22532	0.11824	-0.16888	-0.53288	-0.84297	-0.98693	-0.86901	-0.39402	0.10991	
-0.17319	0.23929	0.13402	-0.15518	-0.54125	-0.88701	-1.08920	-0.92163	-0.47436	-0.12275	
-0.06923	-0.80142	-0.88813	-1.11497	-1.48971	-1.55474	-1.03624	-0.12028	-0.04318	-0.07415	
0.03473	-0.53683	-0.55407	-0.57882	-0.57045	-0.53909	-1.27741	0.49022	0.34023	0.35076	
0.13414	-0.28341	-0.27572	-0.23944	-0.15999	-0.05135	-0.00467	0.22520	0.24296	0.28543	
0.22466	-0.14745	-0.10924	-0.08337	-0.07134	-0.07720	-0.09284	-0.08189	0.05914	0.18816	
0.30234	-0.01666	-0.03037	-0.03705	-0.04456	-0.05384	0.04883	0.05601	0.19670	0.22202	
0.36378	0.05123	0.02549	0.01028	0.00600	0.01388	0.04769	0.07259	0.13921	0.21902	
0.40630	0.13326	0.03646	-0.05141	-0.12140	-0.16482	-0.17011	-0.16357	-0.07212	0.09167	
0.42803	-1.55792	-1.57732	-1.39545	-1.05280	-0.61777	-0.16194	0.28786	0.65733	0.86056	

XXR,XSTRAK= 11.33044135363289 7.250000000000000
XC,X00= 0.8715724118179149 0.7492560896941104
XO = 0.7492560896941104

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ONLOCAL RADIUS

X/L	RADIUS	LOADING
0.00274	0.00997	0.85356
0.02447	0.08771	1.12863
0.06699	0.21962	1.02358
0.12843	0.36477	0.73465
0.20611	0.47220	0.36234
0.29663	0.50000	0.09461
0.39604	0.50000	-0.26344

0.50000	0.50000	1.94638
0.60396	0.50000	1.80796
0.70337	0.50000	1.00943
0.79389	0.50000	0.36931
0.87157	0.50000	0.41726
0.93301	0.50000	0.31625
0.97553	0.50000	0.00446
0.99726	0.50000	0.00223

SECTIONAL SIDE FORCE LOADING

X/L	RADIUS	LOADING
0.00274	0.00997	-0.15934
0.02447	0.08771	-0.20797
0.06699	0.21962	-0.19310
0.12843	0.36477	-0.14298
0.20611	0.47220	-0.07900
0.29663	0.50000	-0.03169
0.39604	0.50000	-0.02844
0.50000	0.50000	0.16526
0.60396	0.50000	-0.07351
0.70337	0.50000	-0.09186
0.79389	0.50000	-0.19587
0.87157	0.50000	-0.17193
0.93301	0.50000	-0.35893
0.97553	0.50000	-1.03692
0.99726	0.50000	-0.51846

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = 0.23698

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = 0.03200

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.14179
(NOTE. BASE DRAG IS NOT INCLUDED)

THE FOLLOWING VALUES ARE OBTAINED BY IGNORING
THE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

THE FUSELAGE LIFT COEFFICIENT = 0.20686

THE FUSELAGE MOMENT COEFFICIENT = 0.08679

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.12415

FUSELAGE VORTEX LIFT =

CLVF = 0.00049 CDVF = 0.00030 CMVF = 0.00023
CNB FROM L.S.= 0.13766 FUSELAGE CNB = 0.17395
CYB FROM L.S. = -1.09595 FUSELAGE CYB = 0.32409
****

SUMMARY OF RESULTS AT ALPHA = 35.000 DEG. M = 0.100
****

CL(LS) = 1.69221 CLF = 0.24066 CL = 1.93287

CDI(LS) = 1.19336 CDF = 0.12415 CDVIS = 0.02197 CD = 1.33948

CM(LS) = -0.48670 CMF = 0.08679 CM = -0.39991
****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF 7.42000 AND A REFERENCE AREA OF 15.14000

PBAR = 0.02000 BETA = 0.08726
****

* SUMMARY OF STABILITY DERIVATIVES *
****

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 35.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

CYB = -0.7718559 CLB = -0.3126869 CNB = 0.3116041

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.7718559 CLB = -0.0774093 CNB = 0.4346010

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 15.14000 AND B/2 = 3.71000

Y/S	BM(RIGHT)	BM(LEFT)
0.16359	0.09699	0.08282
0.23315	0.06422	0.05725
0.30272	0.04151	0.03873
0.36706	0.02623	0.02582
0.45283	0.01307	0.01388
0.53860	0.00649	0.00734
0.61479	0.00331	0.00391
0.72126	0.00107	0.00138
0.85286	0.00020	0.00030
0.95933	-0.00001	-0.00001

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.113528 (RIGHT), = 0.095416 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.13000

*** TAIL SURFACE 1 ***

0.28493	0.00845	0.00743
0.40610	0.00496	0.00422
0.52727	0.00269	0.00221
0.63934	0.00130	0.00102
0.78873	0.00029	0.00020
0.93812	0.00002	0.00001

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.010258 (RIGHT), = 0.009127 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.00000

*** TAIL SURFACE 2 ***

0.04952	0.00025	0.00025
0.18826	0.00017	0.00017
0.38874	0.00008	0.00008
0.61126	0.00003	0.00003
0.81174	0.00000	0.00000
0.95048	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000282 (RIGHT), = 0.000282 (LEFT)

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.18681
0.14645	0.72332
0.37059	0.77547
0.62941	0.81312
0.85355	0.79493
0.98296	0.81131

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C CTIP

0.01704	0.04131
0.14645	0.29655
0.37059	0.53929
0.62941	0.65561
0.85355	0.70591
0.98296	0.71853

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00834
0.20611	0.04068
0.50000	0.05167
0.79389	0.05436
0.97553	0.05416

TIP SUCTION COEFFICIENT = 0.02946 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -2.32742

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.38835
0.14645	1.31389
0.37059	1.11470
0.62941	1.02987
0.85355	0.94903
0.98296	0.95731

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.03356
0.14645	0.24130
0.37059	0.43992
0.62941	0.53605
0.85355	0.57794
0.98296	0.58852

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00834
0.20611	0.04068
0.50000	0.05167
0.79389	0.05436
0.97553	0.05416

TIP SUCTION COEFFICIENT = 0.03550 (ONE SIDE ONLY)

THE X-COORDINATE OF CENTROID OF TIP SUCTION = -1.97153

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 35.000 DEG.

AT ITERATION NUMBER = 8

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

*** THE FOLLOWING ARE RESULTS WITH VORTEX BREAKDOWN ***

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	0.01254	0.16359	5.66986	7.72767
2	0.10908	0.16359	2.87990	6.00488
3	0.28306	0.16359	1.90699	2.95172
4	0.50000	0.16359	1.88754	2.26153
5	0.71694	0.16359	0.55507	0.60668
6	0.89092	0.16359	0.54890	0.46892
7	0.98746	0.16359	0.03515	-0.05289
8	0.01254	0.23315	6.09261	7.08359
9	0.10908	0.23315	4.06678	5.70235
10	0.28306	0.23315	2.84334	3.89812
11	0.50000	0.23315	1.40885	2.23930
12	0.71694	0.23315	0.89297	0.99923
13	0.89092	0.23315	0.32221	0.30332
14	0.98746	0.23315	0.25944	0.15468
15	0.01254	0.30272	5.45239	5.94399
16	0.10908	0.30272	3.77966	5.09135

17	0.28306	0.30272	2.87125	3.54829
18	0.50000	0.30272	1.44000	2.08573
19	0.71694	0.30272	0.75162	0.99403
20	0.89092	0.30272	0.25879	0.19011
21	0.98746	0.30272	0.22347	0.27709
22	0.01254	0.36706	5.65329	2.63619
23	0.10908	0.36706	4.50796	5.52310
24	0.28306	0.36706	3.06202	3.46742
25	0.50000	0.36706	1.78111	2.17010
26	0.71694	0.36706	0.58127	0.97216
27	0.89092	0.36706	0.50553	0.27324
28	0.98746	0.36706	0.41787	0.57403
29	0.01254	0.45283	3.51718	3.77729
30	0.10908	0.45283	3.10030	3.79623
31	0.28306	0.45283	2.23676	2.40637
32	0.50000	0.45283	1.64247	1.73450
33	0.71694	0.45283	1.00756	0.90458
34	0.89092	0.45283	0.59661	0.40185
35	0.98746	0.45283	0.84559	0.93131
36	0.01254	0.53860	2.48440	2.62097
37	0.10908	0.53860	2.22917	2.74245
38	0.28306	0.53860	1.54271	1.63964
39	0.50000	0.53860	1.19754	1.08775
40	0.71694	0.53860	0.84828	0.52568
41	0.89092	0.53860	0.71371	0.43364
42	0.98746	0.53860	1.04677	0.94377
43	0.01254	0.61479	1.92445	1.90755
44	0.10908	0.61479	1.87319	1.99765
45	0.28306	0.61479	1.17308	1.08324
46	0.50000	0.61479	0.84111	0.69356
47	0.71694	0.61479	0.53734	0.23608
48	0.89092	0.61479	0.56975	0.21800
49	0.98746	0.61479	0.93939	0.63938
50	0.01254	0.72126	1.71437	1.61244
51	0.10908	0.72126	1.40448	1.65084
52	0.28306	0.72126	0.63269	0.70773
53	0.50000	0.72126	0.60926	0.50840
54	0.71694	0.72126	0.34434	0.15410
55	0.89092	0.72126	0.44220	0.17755
56	0.98746	0.72126	0.62467	0.32004
57	0.01254	0.85286	1.87207	1.81426
58	0.10908	0.85286	1.38130	1.65222
59	0.28306	0.85286	0.54953	0.48983
60	0.50000	0.85286	0.45340	0.39239
61	0.71694	0.85286	0.23675	0.09470
62	0.89092	0.85286	0.26984	0.12687
63	0.98746	0.85286	0.29946	0.07316
64	0.01254	0.95933	2.01458	1.55079
65	0.10908	0.95933	0.86701	1.23449
66	0.28306	0.95933	-0.20826	0.19900
67	0.50000	0.95933	-0.19127	0.19318
68	0.71694	0.95933	-0.29117	0.00681
69	0.89092	0.95933	-0.19676	0.06090
70	0.98746	0.95933	-0.22890	-0.01765
71	0.01704	0.28493	1.67738	1.31859
72	0.14645	0.28493	0.92887	0.87797
73	0.37059	0.28493	0.74880	0.74622
74	0.62941	0.28493	0.53171	0.53951
75	0.85355	0.28493	0.30223	0.31315
76	0.98296	0.28493	0.08029	0.09218
77	0.01704	0.40610	2.13916	1.90127
78	0.14645	0.40610	0.94741	0.90803
79	0.37059	0.40610	0.70181	0.70518
80	0.62941	0.40610	0.48935	0.50356
81	0.85355	0.40610	0.27493	0.29289
82	0.98296	0.40610	0.07199	0.09233
83	0.01704	0.52727	2.55367	2.54460
84	0.14645	0.52727	0.99922	1.02583
85	0.37059	0.52727	0.67211	0.71062
86	0.62941	0.52727	0.44120	0.48000
87	0.85355	0.52727	0.23592	0.27533
88	0.98296	0.52727	0.05044	0.09302
89	0.01704	0.63934	2.97176	3.18211
90	0.14645	0.63934	1.05915	1.11941
91	0.37059	0.63934	0.64871	0.68200
92	0.62941	0.63934	0.40050	0.42663
93	0.85355	0.63934	0.20393	0.23085
94	0.98296	0.63934	0.03590	0.06734
95	0.01704	0.78873	3.55632	4.04719
96	0.14645	0.78873	1.13897	1.28198

97	0.37059	0.78873	0.56134	0.63284
98	0.62941	0.78873	0.25168	0.30041
99	0.85355	0.78873	0.06043	0.10367
100	0.98296	0.78873	-0.08047	-0.03708
101	0.01704	0.93812	3.65883	4.31732
102	0.14645	0.93812	0.81606	1.03378
103	0.37059	0.93812	0.06820	0.20951
104	0.62941	0.93812	-0.22750	-0.09991
105	0.85355	0.93812	-0.35509	-0.22964
106	0.98296	0.93812	-0.43262	-0.30395
107	0.02447	0.04952	-0.10397	-0.10397
108	0.20611	0.04952	-0.02452	-0.02452
109	0.50000	0.04952	0.01450	0.01450
110	0.79389	0.04952	0.01016	0.01016
111	0.97553	0.04952	0.00608	0.00608
112	0.02447	0.18826	0.04579	0.04579
113	0.20611	0.18826	-0.00637	-0.00637
114	0.50000	0.18826	0.00502	0.00502
115	0.79389	0.18826	0.00595	0.00595
116	0.97553	0.18826	0.00474	0.00474
117	0.02447	0.38874	0.11377	0.11377
118	0.20611	0.38874	-0.00055	-0.00055
119	0.50000	0.38874	0.00037	0.00037
120	0.79389	0.38874	0.00205	0.00205
121	0.97553	0.38874	0.00262	0.00262
122	0.02447	0.61126	0.16466	0.16466
123	0.20611	0.61126	0.00393	0.00393
124	0.50000	0.61126	-0.00087	-0.00087
125	0.79389	0.61126	-0.00108	-0.00108
126	0.97553	0.61126	-0.00098	-0.00098
127	0.02447	0.81174	0.20636	0.20636
128	0.20611	0.81174	0.00871	0.00871
129	0.50000	0.81174	-0.00125	-0.00125
130	0.79389	0.81174	-0.00447	-0.00447
131	0.97553	0.81174	-0.00568	-0.00568
132	0.02447	0.95048	0.22550	0.22550
133	0.20611	0.95048	0.01624	0.01624
134	0.50000	0.95048	-0.00724	-0.00724
135	0.79389	0.95048	-0.01344	-0.01344
136	0.97553	0.95048	-0.01564	-0.01564

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI
0.16359	2.08048	1.40061	0.79839	0.03414	1.22461
0.23315	2.23018	1.56371	0.48898	0.04032	1.37020
0.30272	2.02334	1.58758	0.07386	0.04862	1.27256
0.36706	1.96902	1.84263	-0.17820	0.06843	1.34624
0.45283	1.57851	1.47897	-0.29861	0.06557	1.08171
0.53860	1.10573	1.13519	-0.30303	0.06514	0.79575
0.61479	0.74139	0.87229	-0.24286	0.06501	0.57613
0.72126	0.56207	0.61841	-0.20807	0.06501	0.42447
0.85286	0.48794	0.52953	-0.20716	0.06610	0.36759
0.95933	0.31919	0.07041	-0.05686	0.06699	0.14792

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.28493	0.53858	0.56809	-1.06345	0.03010	0.39211
0.40610	0.56275	0.58207	-1.10109	0.04257	0.40736
0.52727	0.61446	0.59785	-1.17421	0.05331	0.43264
0.63934	0.63884	0.61875	-1.23203	0.06186	0.45072
0.78873	0.64568	0.59838	-1.23230	0.07036	0.44815
0.93812	0.37085	0.38654	-0.59800	0.06996	0.24350

*** TAIL SURFACE 2 ***

0.04952	-0.00704	-0.00704	0.00000	0.00000	0.00000
0.18826	0.00522	0.00522	0.00000	0.00000	0.00000
0.38874	0.00966	0.00966	0.00000	0.00000	0.00000
0.61126	0.01339	0.01339	0.00000	0.00000	0.00000
0.81174	0.01652	0.01652	0.00000	0.00000	0.00000
0.95048	0.01541	0.01541	0.00000	0.00000	0.00000

*** THE FOLLOWING ARE RESULTS WITH VORTEX BREAKDOWN ***

TOTAL LIFT COEFFICIENT = 1.16423

TOTAL INDUCED DRAG COEFFICIENT = 0.82333

TOTAL PITCHING MOMENT COEFFICIENT = -0.20249

THE WING LIFT COEFFICIENT = 1.03936

THE WING INDUCED DRAG COEFFICIENT = 0.73516

THE WING PITCHING MOMENT COEFFICIENT = 0.03621

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.12314 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.08817 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = -0.23870

*** TAIL SURFACE 2 ***

THE TAIL LIFT COEFFICIENT = 0.00172 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 8.6 THETA 2= 25.9 THETA 3= 43.1 THETA 4= 60.4 THETA 5= 77.6
THETA 6= 94.9 THETA 7=116.2 THETA 8=141.7 THETA 9=167.2 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA 9	THET
-0.56649	0.16576	-0.05132	-0.31406	-0.51431	-0.56183	-0.41786	-0.02186	0.52779	0.81724	
-0.54476	-0.09106	-0.31853	-0.59056	-0.79047	-0.82156	-0.64348	-0.18796	0.43186	0.75585	
-0.50224	-0.13148	-0.40030	-0.72541	-0.97338	-1.03305	-0.85682	-0.37057	0.30452	0.65982	
-0.44080	-0.08677	-0.35205	-0.67642	-0.93196	-1.01152	-0.86802	-0.43404	0.18206	0.50914	
-0.36312	0.01894	-0.26049	-0.60697	-0.89132	-1.00460	-0.89714	-0.50717	0.06793	0.37771	
-0.27260	0.09780	-0.20541	-0.58309	-0.89905	-1.03802	-0.94667	-0.56771	0.00333	0.31263	
-0.17319	0.06795	-0.25737	-0.67223	-1.05652	-1.28831	-1.24440	-0.57429	0.00181	0.21134	
-0.06923	-0.69330	-0.76915	-0.89168	-1.20084	-1.64476	-1.87008	-0.15669	0.26482	0.23282	
0.03473	-0.28222	-0.25912	-0.22482	-0.25575	-0.50961	-2.18465	0.21820	0.42474	0.40521	
0.13414	-0.10549	-0.07187	-0.06101	-0.10800	-0.34857	-1.21193	-0.40322	-0.01549	0.03022	
0.22466	-0.30075	-0.37704	-0.49607	-0.64616	-0.64060	-0.34035	-0.02746	0.12573	0.15165	
0.30234	-0.76569	-0.27573	-0.27838	-0.25002	-0.17387	-0.08368	0.05486	0.21355	0.22888	
0.36378	-0.14600	-0.13849	-0.10550	-0.04588	0.02953	0.10247	0.18000	0.25153	0.26117	
0.40630	-0.08050	-0.05365	-0.00677	0.05416	0.11650	0.17026	0.22785	0.27100	0.27613	
0.42803	0.30093	0.29820	0.28783	0.26805	0.23520	0.18980	0.13479	0.06462	-0.00186	

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA10=351.4 THETA11=334.1 THETA12=316.9 THETA13=299.6 THETA14=282.4
THETA15=265.1 THETA16=243.8 THETA17=218.3 THETA18=192.8 THETA

X/L	THETA10	THETA11	THETA12	THETA13	THETA14	THETA15	THETA16	THETA17	THETA18	THET
-0.56649	0.25049	0.16915	-0.04686	-0.31228	-0.51886	-0.57471	-0.37874	0.13847	0.65022	
-0.54476	-0.00187	-0.08746	-0.31388	-0.58902	-0.79611	-0.83664	-0.59737	-0.00689	0.56859	
-0.50224	-0.02600	-0.12564	-0.39186	-0.71965	-0.97553	-1.04622	-0.80754	-0.17366	0.45450	
-0.44080	0.01704	-0.08051	-0.34244	-0.66829	-0.93025	-1.01939	-0.82189	-0.25230	0.32140	
-0.36312	0.12821	0.02720	-0.24687	-0.59288	-0.88190	-1.00327	-0.85085	-0.33337	0.20231	
-0.27260	0.21789	0.11272	-0.17863	-0.55012	-0.86660	-1.01157	-0.88387	-0.38512	0.14065	
-0.17319	0.20682	0.11729	-0.17238	-0.56889	-0.92809	-1.11869	-0.83300	-0.32157	0.07083	
-0.06923	-0.66287	-0.70861	-0.86527	-1.17002	-1.39353	-1.24418	0.08066	0.24779	0.20624	
0.03473	-0.28693	-0.28909	-0.30481	-0.35418	-0.51746	-1.85949	0.37191	0.40134	0.37966	
0.13414	-0.14573	-0.18376	-0.21513	-0.24459	-0.31891	-0.66703	-0.04778	0.10063	0.06473	
0.22466	-0.43104	-0.39565	-0.38022	-0.38160	-0.32176	-0.16272	0.00133	0.09056	0.12996	
0.30234	-0.23641	-0.23467	-0.23128	-0.20501	-0.14846	-0.08100	0.05244	0.19088	0.21425	
0.36378	-0.13171	-0.11447	-0.08663	-0.04162	0.01494	0.07131	0.13091	0.19128	0.23179	
0.40630	-0.08907	-0.07919	-0.05049	-0.00682	0.04219	0.08924	0.12363	0.17416	0.23365	

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    0.42803     0.29287     0.[illegible]7268     0.24165     0.19888     0.14283     0.07943    -0.01572    -0.07473    -0.06180
 XXR,XSTRAK=   7.851425977361972        7.250000000000000
 X0,X00=  0.6039558444139978      0.7492560896941104
 X0 =  0.6039558444139978

    TOTAL PRESSURE LOADING AT EACH X-STATION, BASED  ONLOCAL RADIUS

    X/L         RADIUS      LOADING
    0.00274     0.00997     0.85787
    0.02447     0.08771     1.13610
    0.06699     0.21962     1.03393
    0.12843     0.36477     0.74989
    0.20611     0.47220     0.38834
    0.29663     0.50000     0.16437
    0.39604     0.50000     0.20002
    0.50000     0.50000     2.01405
    0.60396     0.50000     1.23356
    0.70337     0.50000     0.23442
    0.79389     0.50000     1.01459
    0.87157     0.50000     0.83885
    0.93301     0.50000     0.63796
    0.97553     0.50000     0.53445
    0.99726     0.50000     0.26723

   SECTIONAL SIDE FORCE LOADING

    X/L         RADIUS      LOADING
    0.00274     0.00997    -0.16077
    0.02447     0.08771    -0.20935
    0.06699     0.21962    -0.19279
    0.12843     0.36477    -0.13934
    0.20611     0.47220    -0.06769
    0.29663     0.50000     0.00256
    0.39604     0.50000     0.22342
    0.50000     0.50000     0.37188
    0.60396     0.50000     0.10126
    0.70337     0.50000     0.26547
    0.79389     0.50000     0.23146
    0.87157     0.50000     0.02782
    0.93301     0.50000    -0.04393
    0.97553     0.50000    -0.14731
    0.99726     0.50000    -0.07366

    THE FUSELAGE POTENTIAL LIFT COEFFICIENT =   0.25585

    THE FUSELAGE POTENTIAL MOMENT COEFFICIENT =   0.00311

    THE FUSELAGE INDUCED DRAG COEFFICIENT =   0.15414
    (NOTE. BASE DRAG IS NOT INCLUDED)

 THE FOLLOWING VALUES ARE OBTAINED BY IGNORING
 THE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

    THE FUSELAGE LIFT COEFFICIENT =   0.16112

    THE FUSELAGE MOMENT COEFFICIENT =   0.15778

    THE FUSELAGE INDUCED DRAG COEFFICIENT =   0.09080

    FUSELAGE VORTEX LIFT =

    CLVF =   0.00052  CDVF =   0.00031  CMVF =   0.00024
  CNB FROM L.S.=   0.09789 FUSELAGE CNB =   0.22179
  CYB FROM L.S. =  -0.79484 FUSELAGE CYB =   0.69235
 ***************************************

  SUMMARY OF RESULTS AT ALPHA =  35.000  DEG.  M =  0.100
 ***************************************

   CL(LS) =   1.16423   CLF =   0.18407   CL =   1.34830

   CDI(LS)=  0.82333   CDF =  0.09080   CDVIS =  0.02197   CD =  0.93611

   CM(LS) =  -0.20249   CMF =   0.15778   CM =  -0.04471
 ***************************************

  THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
    A REFERENCE SPAN OF    7.42000   AND A REFERENCE AREA OF   15.14000

    PBAR =   0.02000  BETA =   0.08726
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* SUMMARY OF STABILITY DERIVATIVES *

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***STABILITY DERIVATIVES EVALUATED AT ALPHA = 35.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

CYB = -0.1024962 CLB = -0.1724891 CNB = 0.3196837

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.1024962 CLB = 0.0420682 CNB = 0.3608052

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 15.14000 AND B/2 = 3.71000

Y/S	BM(RIGHT)	BM(LEFT)
0.16359	0.05830	0.05321
0.23315	0.03712	0.03563
0.30272	0.02366	0.02357
0.36706	0.01498	0.01534
0.45283	0.00760	0.00797
0.53860	0.00398	0.00408
0.61479	0.00214	0.00206
0.72126	0.00074	0.00059
0.85286	0.00013	0.00005
0.95933	-0.00001	-0.00002

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.069581 (RIGHT), = 0.062183 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.13000

*** TAIL SURFACE 1 ***

0.28493	0.00485	0.00437
0.40610	0.00281	0.00244
0.52727	0.00149	0.00125
0.63934	0.00070	0.00055
0.78873	0.00014	0.00009
0.93812	0.00001	0.00001

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.005911 (RIGHT), = 0.005391 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 15.14000 AND B/2 = 2.00000

*** TAIL SURFACE 2 ***

0.04952	0.00043	0.00043
0.18826	0.00030	0.00030
0.38874	0.00015	0.00015
0.61126	0.00005	0.00005
0.81174	0.00001	0.00001
0.95048	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA

AT THE TAIL ROOT = 0.000474 (RIGHT), = 0.000474 (LEFT)

```
F-16XL WITH FREE VORTEX FILAMENTS
GROUP 2 NCASE,NGRD,NSUR
1 0  2
GROUP 3 LAT,IBLC,KT,IBD,NLDMM
1 1 1 1 0
GROUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
2 7 4 2 0 0
GROUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
1 1 0 0 0 0 0
GROUP 6 DF
0.
GROUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
6 0 0 0 0 0 0 0
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
1.38 10.0 .4 8.0  10.3  2.8  0. 0.
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
8.0 10.3 2.8 9.5 10.5 4.05 0. 0.
GROUP 24. ICNLE
0
GROUP 25. RC
.0007
GROUP 26 TWST,RINC,TINP
0. 0. 0.
GROUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
2  3  5 0 0 0
GROUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
1 1 0 0 0 1 0
GROUP 6 DF
0.
GROUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
5 0 0 0 0 0 0 0
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
3.3  11.8  .0  9.5  11.8  .4  .4 90.
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
9.5  11.18  .4  10.25  11.1 1.4 .4 90.
GROUP 24. ICNLE
0
GROUP 25. RC
.0
GROUP 26 TWST,RINC,TINP
0.  0.  0.
GROUP 39 AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
0.1  2.15  18.82 6.08 4.05 6.7 0.
GROUP 40 ALNM,SNUM,DVRTX,CLDS
2.  1.  0.  0.
GROUP 41. ALPA
50.  30.
GROUP 42 SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
1. 7. 1.84  7.045 9.15 2.8 3.8 1.
GROUP 43 HEIGHT,ATT
0.  0.
GROUP 44 P,BK,RL
.01 0.08 0.
GROUP 45 KF,NT,NCUM,NF,IBY,IBCM
1   2  8  16  1  0
GROUP 46 XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
0.  12.  1.  9.  0.  0.8  0.8  1.38
GROUP 47 ISYM,JSCT
1  0
GROUP XFF
0.  0.5  1.0  1.38 3.  6.  8.  10.  12.
GROUP RFF
0.  .2  .3  .4  .4 .4 .4 .4 .4
GROUP XFD
0. 1. 2. 3. 4. 5. 6. 7. 12.
GROUP 51 RFD
0. .3 .55 .8 .75 .7 .65 .6 .6
GROUP 57. IFORB1
  1
GROUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
  0 1 0 0 0
GROUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
```

```
    0.  0.  0.  0.25  0.
  GROUP 60. XORING(I), I=1,6
    0.04  1.23  -0.62  1.71  0.33  0.15
  GROUP 69. IWAKE
    0
  GROUP 79. LEV
    1
  GROUP 80. NSUF,NPC,ICP,MSTW,MITE
    1  0  1  0  10
  GROUP 81. ITIPV,MST
    0  0
  GROUP 82. MULTIG,KITR
    1  4
  GROUP 83. DELTA,DELT,XEND
    0.8  0.9  10.
  GROUP 84. NBRR
    0
  GROUP 86. DIF1,DIF2
    1.25  1.25
  GROUP 87. NQ1,IREA,ISTAR
    2  0   0
```

Unit #21

```
**************************************
-16XL WITH FREE VORTEX FILAMENTS
**************************************
RCUP 2 NCASE,NGRD,NSUR
       1         0         2
**************************************
CASE NUMBER = 1
**************************************
INPUT DATA
RCUP 3 LAT,IBLC,KT,IBD,NLDMM
       1         1         1         1         0
RCUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
       2         7         4         2         0         0
RCUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
       1         1         0         0         0         0         0
RCUP 6 DF
 0.000000
RCUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
       6         0         0         0         0         0         0         0
RCUP 17 IPN
       0
RCUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 1.380000 10.000000  0.400000  8.000000 10.300000  2.800000  0.000000  0.000000
RCUP 17 IPN
       0
RCUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 8.000000 10.300000  2.800000  9.500000 10.500000  4.050000  0.000000  0.000000
RCUP 24. ICNLE
       0
RCUP 25. RC
 0.000700
RCUP 26 TWST,RINC,TINP
 0.000000  0.000000  0.000000
RCUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
       2         3         5         0         0         0
RCUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
       1         1         0         0         0         1         0
RCUP 6 DF
 0.000000
RCUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
       5         0         0         0         0         0         0         0
RCUP 17 IPN
       0
RCUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 8.300000 11.800000  0.000000  9.500000 11.800000  0.400000  0.400000 90.000000
RCUP 17 IPN
       0
RCUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
 9.500000 11.180000  0.400000 10.250000 11.100000  1.400000  0.400000 90.000000
RCUP 24. ICNLE
       0
RCUP 25. RC
 0.000000
RCUP 26 TWST,RINC,TINP
 0.000000  0 000000  0.000000
RCUP 39 AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
 0.100000  2.150000 18.820000  6.080000  4.050000  6.700000  0.000000
RCUP 40 ALNM,SNUM,DVRTX,CLDS
 2.000000  1.000000  0.000000  0.000000
RCUP 41. ALPA
50.000000 30.000000
RCUP 42 SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
 1.000000  7.000000  1.840000  7.045000  9.150000  2.800000  3.800000  1.000000
RCUP 43 HEIGHT,ATT
 0.000000  0.000000
RCUP 44 P,BK,RL
 0.010000  0.080000  0.000000
RCUP 45 KF,NT,NCUM,NF,IBY,IBCM
       1         2         8        16         1         0
RCUP 46 XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
 0.000000 12.000000  1.000000  9.000000  0.000000  0.800000  0.800000  1.380000
RCUP 47 ISYM,JSCT
         1           0
RCUP XFF
 0.000000  0.500000  1.000000  1.380000  3.000000  6.000000  8.000000 10.000000
12.000000
RCUP RFF
```

```
 0.000000  0.200000  0.300000  0.400000  0.400000  0.400000  0.400000  0.400000
 0.400000
RCUP XFD
 0.000000  1.000000  2.000000  3.000000  4.000000  5.000000  6.000000  7.000000
12.000000
RCUP 51 RFD
 0.000000  0.300000  0.550000  0.800000  0.750000  0.700000  0.650000  0.600000
 0.600000
RCUP 57. IFORB1
       1
RCUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
       0         1         0         0         0
RCUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
 0.000000  0.000000  0.000000  0.250000  0.000000
RCUP 60. XCRING(I), I=1,6
 0.040000  1.230000 -0.620000  1.710000  0.330000  0.150000
RCUP 69. IWAKE
       0
RCUP 79. LEV
       1
RCUP 80. NSUF,NPC,ICP,MSTW,MITE
       1         0         1         0         8
RCUP 81. ITIPV,MST
       0         0
RCUP 82. MULTIG,KITR
       1         4
RCUP 83. DELTA,DELT,XEND
 0.800000  0.900000 10.000000
RCUP 84. NBRR
       0
RCUP 86. DIF1,DIF2
 1.250000  1.250000
RCUP 87. NQ1,IREA,ISTAR
       2         0         0

    HALF SW= 0.18820E-02          CREF= 0.60800E-01

    TOTAL WETTED SURFACE AREA = 104.43604

    SKIN FRICTION COEFFICIENT =    0.01056
 **************************************
  ANGLE OF ATTACK =  50.000  DEG.
 **************************************
exiting invn for lateral

  CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

     X/C       CTIP
   0.01704   0.40086
   0.14645   2.57355
   0.37059   3.75237
   0.62941   4.06714
   0.85355   4.28162
   0.98296   4.31644

  CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

     X/C       CTIP
   0.02447   0.00000
   0.20611   0.00000
   0.50000   0.00000
   0.79389   0.00000
   0.97553   0.00000

IP SUCTION COEFFICIENT =    0.09445  (ONE SIDE ONLY)

HE X-COORDINATE OF CENTROID OF TIP SUCTION =  -3.37149

    VORTEX-BREAKDOWN CHARACTERISTICS

  ***FOR SURFACE NUMBER  1  ***

    (FOR NONCAMBERED WING)

  CENTROID TO MAX. SUCTION FORCE, YBAR =   0.58525

  TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)=   2.50683

  L.E. LENGTH OF MAX. SUCTION CENTROID =   1.89097
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```
ALPHA FOR VORTEX BREAKDOWN AT T.E. = 35.47277 DEG.
   (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

CENTROID TO MAX. SUCTION FORCE, YBAR = 0.20353

TOTAL SUCTION FORCE TO MAX. CS*C/(CB*SIN(ALP)**2)= 0.67376

L.E. LENGTH OF MAX. SUCTION CENTROID = 0.31793

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 6.79191 DEG.
   (WITHOUT CAMBER CORRECTION, FOR SYMMETRICAL LOADING)

***FOR SURFACE NUMBER 2 ***

   (FOR NONCAMBERED WING)

  VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER 1 ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID = 1.41069

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 26.19023 DEG.
   (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

L.E. LENGTH OF MAX. SUCTION CENTROID = 0.29096

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 6.16470 DEG.
   (WITHOUT CAMBER CORRECTION, FOR RIGHT WING IN SIDESLIP)

***FOR SURFACE NUMBER 2 ***

   (FOR NONCAMBERED WING)

  VORTEX-BREAKDOWN CHARACTERISTICS

***FOR SURFACE NUMBER 1 ***

   (FOR NONCAMBERED WING)

L.E. LENGTH OF MAX. SUCTION CENTROID = 2.43566

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 41.57248 DEG.
   (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

L.E. LENGTH OF MAX. SUCTION CENTROID = 0.35290

ALPHA FOR VORTEX BREAKDOWN AT T.E. = 7.63848 DEG.
   (WITHOUT CAMBER CORRECTION, FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER 2 ***

   (FOR NONCAMBERED WING)
***************************************
***THE FOLLOWING ALPHAS FOR VORTEX BREAKDOWN AT T.E.HAVE BEEN CORRECTED FOR
       CAMBER AND ADVERSE PRESSURE GRADIENT IN VORTEX LIFT AUGMENTATION, IF ANY***

***FOR SURFACE NUMBER 1 ***

REVISED ALPHA BDTE = 31.679 DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE = 22.397 DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE = 37.779 DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE = 6.792 DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE = 6.165 DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE = 7.638 DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER 2 ***
```

```
REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR LEFT WING IN SIDESLIP)
****************************************
ANGLE OF ATTACK =  30.000  DEG.
****************************************

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

   X/C      CTIP
 0.01704   0.17078
 0.14645   1.07083
 0.37059   1.59859
 0.62941   1.73269
 0.85355   1.82406
 0.98296   1.83890

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

   X/C      CTIP
 0.02447   0.00000
 0.20611   0.00000
 0.50000   0.00000
 0.79389   0.00000
 0.97553   0.00000

IP SUCTION COEFFICIENT =   0.04024  (ONE SIDE ONLY)

HE X-COORDINATE OF CENT OID OF TIP SUCTION =  -3.37149

***FOR SURFACE NUMBER  1  ***

REVISED ALPHA BDTE =    31.679  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    22.397  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    37.779  DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE =     6.792  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =     6.165  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =     7.638  DEG.
   (FOR LEFT WING IN SIDESLIP)

***FOR SURFACE NUMBER  2  ***

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR LEFT WING IN SIDESLIP)

REVISED ALPHA BDTE =    90.000  DEG.
   (FOR SYMMETRICAL LOADING)

REVISED ALPHA BDTE =    90.000  DEG.
```

(FOR RIGHT WING IN SIDESLIP)

REVISED ALPHA BDTE = 90.000 DEG.
(FOR LEFT WING IN SIDESLIP)

LOCATION OF VORTEX BREAKDOWN AT X-COORDINATE = 5.07888

LOCATION OF VORTEX BREAKDOWN AT X-COORDINATE = 13.24029
(FOR THE LEFT SIDE)

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 30.000 DEG.

WITHOUT VORTEX FLOW EFFECT

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VORTEX	XV	YV	CP
1	0.01704	0.12132	1.70092
2	0.14645	0.12132	0.87426
3	0.37059	0.12132	0.59603
4	0.62941	0.12132	0.43808
5	0.85355	0.12132	0.42002
6	0.98296	0.12132	0.04895
7	0.01704	0.18555	2.21765
8	0.14645	0.18555	0.83449
9	0.37059	0.18555	0.65191
10	0.62941	0.18555	0.48332
11	0.85355	0.18555	0.39697
12	0.98296	0.18555	0.09084
13	0.01704	0.28167	2.68018
14	0.14645	0.28167	0.99724
15	0.37059	0.28167	0.69037
16	0.62941	0.28167	0.54063
17	0.85355	0.28167	0.38039
18	0.98296	0.28167	0.10915
19	0.01704	0.39506	3.30288
20	0.14645	0.39506	1.18105
21	0.37059	0.39506	0.79143
22	0.62941	0.39506	0.61647
23	0.85355	0.39506	0.38500
24	0.98296	0.39506	0.11561
25	0.01704	0.50845	4.03011
26	0.14645	0.50845	1.43582
27	0.37059	0.50845	0.96738
28	0.62941	0.50845	0.71833
29	0.85355	0.50845	0.40053
30	0.98296	0.50845	0.11935
31	0.01704	0.60457	4.92376
32	0.14645	0.60457	1.79883
33	0.37059	0.60457	1.26136
34	0.62941	0.60457	0.78389
35	0.85355	0.60457	0.40148
36	0.98296	0.60457	0.11860
37	0.01704	0.66880	6.10385
38	0.14645	0.66880	2.50919
39	0.37059	0.66880	1.36240
40	0.62941	0.66880	0.75412
41	0.85355	0.66880	0.38143
42	0.98296	0.66880	0.11271
43	0.01704	0.72083	8.39454
44	0.14645	0.72083	2.54811
45	0.37059	0.72083	1.30511
46	0.62941	0.72083	0.71823
47	0.85355	0.72083	0.35746
48	0.98296	0.72083	0.10579
49	0.01704	0.79799	8.63303
50	0.14645	0.79799	2.71973
51	0.37059	0.79799	1.35432
52	0.62941	0.79799	0.69034
53	0.85355	0.79799	0.32547
54	0.98296	0.79799	0.09676
55	0.01704	0.89337	8.92467
56	0.14645	0.89337	2.75372
57	0.37059	0.89337	1.22712
58	0.62941	0.89337	0.54114
59	0.85355	0.89337	0.24237
60	0.98296	0.89337	0.07208
61	0 01704	0.97053	8.20896

62	0.14645	0.97053	1.93189
63	0.37059	0.97053	0.54912
64	0.62941	0.97053	0.22999
65	0.85355	0.97053	0.11022
66	0.98[illegible]6	0.97053	0.03458
67	0.02447	0.04184	0.00000
68	0.20611	0.04184	0.00000
69	0.50000	0.04184	0.00000
70	0.79389	0.04184	0.00000
71	0.97553	0.04184	0.00000
72	0.02447	0.14286	0.00000
73	0.20611	0.14286	0.00000
74	0.50000	0.14286	0.00000
75	0.79389	0.14286	0.00000
76	0.97553	0.14286	0.00000
77	0.02447	0.24387	0.00000
78	0.20611	0.24387	0.00000
79	0.50000	0.24387	0.00000
80	0.79389	0.24387	0.00000
81	0.97553	0.24387	0.00000
82	0.02447	0.33356	0.00000
83	0.20611	0.33356	0.00000
84	0.50000	0.33356	0.00000
85	0.79389	0.33356	0.00000
86	0.97553	0.33356	0.00000
87	0.02447	0.46429	0.00000
88	0.20611	0.46429	0.00000
89	0.50000	0.46429	0.00000
90	0.79389	0.46429	0.00000
91	0.97553	0.46429	0.00000
92	0.02447	0.64286	0.00000
93	0.20611	0.64286	0.00000
94	0.50000	0.64286	0.00000
95	0.79389	0.64286	0.00000
96	0.97553	0.64286	0.00000
97	0.02447	0.82143	0.00000
98	0.20611	0.82143	0.00000
99	0.50000	0.82143	0.00000
100	0.79389	0.82143	0.00000
101	0.97553	0.82143	0.00000
102	0.02447	0.95215	0.00000
103	0.20611	0.95215	0.00000
104	0.50000	0.95215	0.00000
105	0.79389	0.95215	0.00000
106	0.97553	0.95215	0.00000

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI	CS*C	CAV
0.12132	0.57800	0.57800	0.21212	0.08270	0.35118	1.70742	0.00000
0.18555	0.63970	0.63970	0.18688	0.11639	0.39393	2.27100	0.00000
0.28167	0.74688	0.74688	0.13475	0.18551	0.47041	3.23772	0.00000
0.39506	0.90043	0.90043	0.04168	0.28087	0.57922	4.10281	0.00000
0.50845	1.11655	1.11655	-0.09554	0.41897	0.73318	4.84707	0.00000
0.60457	1.40806	1.40806	-0.26448	0.62293	0.94458	5.54460	0.00000
0.66880	1.76056	1.76056	-0.42030	0.93765	1.21461	6.64970	0.00000
0.72083	1.91116	1.91116	-0.52146	1.00684	1.31618	3.20263	0.00000
0.79799	1.97306	1.97306	-0.61529	1.04961	1.36095	2.84394	0.00000
0.89337	1.95807	1.95807	-0.68320	1.12512	1.36826	2.39228	0.00000
0.97053	1.47641	1.47641	-0.52672	0.98932	1.06148	1.62485	0.00000

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.04184	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.14286	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.24387	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.33356	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.46429	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.64286	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.82143	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.95215	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

*** THE FOLLOWING ARE RESULTS WITHOUT VORTEX FLOW EFFECT ***

TOTAL LIFT COEFFICIENT = 0.80509

TOTAL INDUCED DRAG COEFFICIENT = 0.52833

THE INDUCED DRAG PARAMETER = 0.81511

TOTAL PITCHING MOMENT COEFFICIENT = -0.02918

THE WING LIFT COEFFICIENT = 0.80509

THE WING INDUCED DRAG COEFFICIENT = 0.52833

THE WING PITCHING MOMENT COEFFICIENT = -0.02918

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 11.3 THETA 2= 33.8 THETA 3= 56.3 THETA 4= 78.8 THETA 5=101.3
THETA 6=123.8 THETA 7=146.3 THETA 8=168.8 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA
-0.55593	0.28593	-0.01755	-0.42655	-0.66420	-0.54256	-0.08016	0.50086	0.89743	
-0.53680	-0.09347	-0.30055	-0.56342	-0.67270	-0.49201	-0.04885	0.46955	0.01491	
-0.49929	-0.11812	-0.34560	-0.64673	-0.80724	-0.68372	-0.29509	0.18047	0.50226	
-0.44484	-0.01160	-0.17719	-0.41306	-0.56426	-0.48740	-0.29893	-0.07322	0.08476	
-0.37553	0.22253	0.11371	0.00578	0.08019	0.20538	0.12602	0.14454	0.20048	
-0.29403	0.06474	0.02746	0.01500	0.06127	0.34424	0.40731	0.37815	0.38949	
-0.20348	0.18209	0.13933	0.11088	0.14390	0.20761	0.24138	0.26725	0.29457	
-0.10734	0.04378	0.05449	0.07773	0.12552	0.26063	0.38021	0.41725	0.42625	
-0.00932	0.14042	0.07856	0.00736	-0.00251	0.10628	0.20583	0.27891	0.33253	
0.08681	0.10273	0.11493	0.14114	0.19058	0.26520	0.33195	0.36821	0.38150	
0.17737	0.16150	0.08217	-0.04544	-0.18466	0.51890	0.27808	0.27622	0.31497	
0.25886	0.17249	0.18062	0.19508	0.20896	0.27770	0.29814	0.31447	0.32219	
0.32817	0.21121	0.17207	0.13040	0.12037	0.13364	0.16741	0.22599	0.27371	
0.38263	0.21485	0.20993	0.21019	0.22160	0.23478	0.24756	0.26550	0.28010	
0.42014	0.01559	0.02486	0.06054	0.13212	0.21750	0.30359	0.38844	0.44432	
0.43926	0.07157	0.49941	0.90404	0.66670	-0.59290	-2.68308	-4.36922	-6.26127	

X0 = 0.7431163103616407

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ONLOCAL RADIUS

X/L	RADIUS	LOADING
0.00241	0.01156	0.90932
0.02153	0.10334	1.35079
0.05904	0.24169	0.97449
0.11349	0.39525	0.19699
0.18230	0.40000	0.07480
0.26430	0.40000	0.69371
0.35486	0.40000	0.23688
0.45099	0.40000	0.68420
0.54901	0.40000	0.38210
0.64514	0.40000	0.47483
0.73570	0.40000	0.49391
0.81720	0.40000	0.25822
0.88651	0.40000	0.10153
0.94096	0.40000	0.10488
0.97847	0.40000	0.68681
0.99759	0.40000	0.34341

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = 0.04452

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = 0.00659

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.02051
(NOTE. BASE DRAG IS NOT INCLUDED)

HE FOLLOWING VALUES ARE OBTAINED BY IGNORING
HE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

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THE FUSELAGE LIFT COEFFICIENT =   0.03554

THE FUSELAGE MOMENT COEFFICIENT =   0.01201

THE FUSELAGE INDUCED DRAG COEFFICIENT =   0.01872

FUSELAGE VORTEX LIFT =

CLVF =   0.01232  CDVF =   0.00644  CMVF =   0.00402
*****************************************************
*         RESULTS FROM FOREBODY                      *
*****************************************************
ALPHAT =   17.68346304558645    CLFP=  7.726599115878760BE-03BASE AREA=
 0.5022601964813288

**********SUMMARY OF FOREBODY INFO**************

HE TOTAL FORCE AND MOMENT AT ANGLE OF ATTACK   17.683FOR BRANCH  1  ARE
OTAL NORMAL FORCE COEFFICIENT DUE TO VORTEX=  0.000008
OTAL  SIDE  FORCE COEFFICIENT DUE TO VORTEX= -0.000150
OTAL    LIFT      COEFFICIENT DUE TO VORTEX=  0.000008
OTAL  DRAG  FORCE COEFFICIENT DUE TO VORTEX=  0.000003
OTAL YAWING MOMENT COEFFICIENT DUE TO VORTEX= -0.000132
OTAL PITCHING MOMENT COEFFICIENT DUE TO VORTEX=  0.000007


************** END OF FOREBODY ***************
ILMAX,ILFOR,ILAFT           31          17          15
(X, Y AND Z-COORDINATES)
   THE RIGHT-SIDE FOREBODY VORTEX LOCATIONS
    1.35974    2.55974    3.75974    4.95974    6.15974    7.35974    8.55974    9.75974
   10.95974   12.15974   13.35974   14.55974   15.75974   16.95974   18.15974
   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887
   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887   -0.07887
    0.44703    0.44703    0.44703    0.44703    0.44703    0.44703    0.44703    0.44703
    0.44703    0.44703    0.44703    0.44703    0.44703    0.44703    0.44703
   THE LEFT-SIDE FOREBODY VORTEX LOCATIONS
    1.35974    2.55974    3.75974    4.95974    6.15974    7.35974    8.55974    9.75974
   10.95974   12.15974   13.35974   14.55974   15.75974   16.95974   18.15974
   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754
    0.14754   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754   -0.14754
    0.46235    0.46235    0.46235    0.46235    0.46235    0.46235    0.46235    0.46235
    0.46235    0.46235    0.46235    0.46235    0.46235    0.46235    0.46235
X0 =  0.7996000000000000
X0 =  0.7982515993771843
X0 =  0.7982515993771843
 CNB FROM L.S.=   0.09349 FUSELAGE CNB =  -0.01891
 CYB FROM L.S. =  -0.26560 FUSELAGE CYB =  -0.05538
XC =  0.7996000000000000
***************************************

 SUMMARY OF RESULTS WITHOUT VORTEX FLOW EFFECT AT ALPHA = 30.000  DEG.  M =  0.100
***************************************

   CL(LS) =   0.80509   CLF =   0.04014   CL =   0.84524

   CDI(LS)=  0.52833   CDF =  0.01872   CDVIS =  0.01056   CD =  0.55761

   CM(LS) =  -0.02918   CMF =   0.01201   CM =  -0.01717
***************************************
***************************************

 THE FOLLOWING PARAMETERS ARE USED IN THE METHOD OF SUCTION ANALOGY

 CLP =   0.66627   CLVLE =   0.58139   CLVSE =   0.01650   CLVAUG =   0.08203

 CDP =  0.35882  CDVLE =  0.33567  CDVSE =  0.00952  CDVAUG =  0.04736  CDDVP =  0.00000

 CMP =  -0.02918   CMVLE =   0.08437   CMVSE =  -0.01056   CMVAUG =  -0.03224

 CLDVP =   0.00000  CLDVV =   0.00000  CLF =   0.03555  CL =   1.38174

 CDDVV =   0.00000  CDF =   0.01873  CDVIS =   0.01056  CD =   0.78066

 CMDVP =   0.00000  CMDVV =   0.00000  CMF =   0.01201  CM =   0.02440

 CAXP =   0.00000   CAXV =   0.00000
***************************************

 THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
```

A REFERENCE SPAN OF 8.10000 AND A REFERENCE AREA OF 37.64000

PBAR = 0.01000 BETA = 0.08000

****

STABILITY DERIVATIVES WITHOUT VORTEX FLOW EFFECT

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***STABILITY DERIVATIVES EVALUATED AT ALPHA = 30.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

CYB = -0.3209841 CLB = -0.4086256 CNB = 0.0745833

CYP = 0.5142157 CLP = -0.0713414 CNP = -0.1346044

CYR = 0.2324756 CLR = 0.2013152 CNR = -0.0806349

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.3209841 CLB = -0.3165885 CNB = 0.2689039

CYP = 0.5615616 CLP = -0.0447781 CNP = -0.1553063

CYR = -0.0557780 CLR = 0.1806133 CNR = -0.1071982

****

STABILITY DERIVATIVES WITH EDGE VORTEX SEPARATION

****

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 30.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

**INCLUDING THE EFFECT OF LE AND SE VORTEX LIFT*

CYB = -0.7093309 CLB = -0.1982577 CNB = -0.0171837

CYP = 0.0020781 CLP = -0.2293917 CNP = -0.0004434

CYR = 0.1400048 CLR = 0.1586298 CNR = -0.0906391

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.7093309 CLB = -0.1802881 CNB = 0.0842474

CYP = 0.0718021 CLP = -0.1262068 CNP = 0.0200917

CYR = 0.1202087 CLR = 0.1791649 CNR = -0.1938240

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 30.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

INCLUDING THE EFFECT OF LE VORTEX LIFT

CYB = -0.7562752 CLB = -0.2503080 CNB = 0.0024115

CYP = 0.1082389 CLP = -0.1765910 CNP = -0.0446046

CYR = 0.1078683 CLR = 0.1522505 CNR = -0.0777804

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.7562752 CLB = -0.2155673 CNB = 0.1272424

CYP = 0.1476718 CLP = -0.1052763 CNP = -0.0287298

CYR = 0.0392973 CLR = 0.1681252 CNR = -0.1490950

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 37.64000 AND B/2 = 4.05000
(WITHOUT VORTEX FLOW EFFECT)

Y/S	BM(RIGHT)	BM(LEFT)
0.12132	0.15158	0.15158

0.18555	0.12741	0.12741
0.28167	0.09539	0.09539
0.39506	0.06389	0.06389
0.50845	0.03927	0.03927
0.60457	0.02346	0.02346
0.66880	0.01549	0.01549
0.72083	0.01033	0.01033
0.79799	0.00471	0.00471
0.89337	0.00102	0.00102
0.97053	0.00003	0.00003

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.160568 (RIGHT), = 0.160568 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 37.64000 AND B/2 = 1.40000

*** TAIL SURFACE 1 ***

0.04184	0.00000	0.00000
0.14286	0.00000	0.00000
0.24387	0.00000	0.00000
0.33356	0.00000	0.00000
0.46429	0.00000	0.00000
0.64286	0.00000	0.00000
0.82143	0.00000	0.00000
0.95215	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000000 (RIGHT), = 0.000000 (LEFT)

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 37.64000 AND B/2 = 4.05000
(FOR VORTEX FLOW)

Y/S	BM(RIGHT)	BM(LEFT)
0.12132	0.21473	0.21473
0.18555	0.18367	0.18367
0.28167	0.14120	0.14120
0.39506	0.09726	0.09726
0.50845	0.06068	0.06068
0.60457	0.03605	0.03605
0.66880	0.02370	0.02370
0.72083	0.01613	0.01613
0.79799	0.00764	0.00764
0.89337	0.00174	0.00174
0.97053	0.00006	0.00006

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.226087 (RIGHT), = 0.226087 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 37.64000 AND B/2 = 1.40000

*** TAIL SURFACE 1 ***

0.04184	0.00000	0.00000
0.14286	0.00000	0.00000

0.24387	0.00000	0.00000
0.33356	0.00000	0.00000
0.46429	0.00000	0.00000
0.64286	0.00000	0.00000
0.82143	0.00000	0.00000
0.95215	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000000 (RIGHT), = 0.000000 (LEFT)

exiting invn for lateral

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.21919
0.14645	0.76641
0.37059	0.68732
0.62941	0.66363
0.85355	0.62427
0.98296	0.62498

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00159
0.20611	0.00644
0.50000	0.00764
0.79389	0.00889
0.97553	0.00903

IP SUCTION COEFFICIENT = 0.01758 (ONE SIDE ONLY)

HE X-COORDINATE OF CENTROID OF TIP SUCTION = -3.31073

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.11324
0.14645	0.42279
0.37059	0.40955
0.62941	0.38867
0.85355	0.35176
0.98296	0.34660

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00159
0.20611	0.00644
0.50000	0.00764
0.79389	0.00889
0.97553	0.00903

IP SUCTION COEFFICIENT = 0.01014 (ONE SIDE ONLY)

HE X-COORDINATE OF CENTROID OF TIP SUCTION = -3.31625

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 30.000 DEG.

AT ITERATION NUMBER = 7

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

*** THE FOLLOWING ARE RESULTS WITHOUT VORTEX BREAKDOWN ***

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	0.01254	0.12132	0.65222	1.55447
2	0.10908	0.12132	1.38482	2.73755
3	0.28306	0.12132	1.67828	1.98014
4	0.50000	0.12132	1.15530	1.42167
5	0.71694	0.12132	1.06928	1.18231
6	0.89092	0.12132	0.74797	0.91224
7	0.98746	0.12132	0.33535	0.34838

8	0.01254	0.18555	3.38841	3.28842
9	0.10908	0.18555	2.29328	1.44003
10	0.28306	0.18555	1.78913	2.60142
11	0.50000	0.18555	1.32272	2.01560
12	0.71694	0.18555	1.21693	1.61441
13	0.89092	0.18555	0.79154	1.13119
14	0.98746	0.18555	0.43230	0.59155
15	0.01254	0.28167	3.69057	3.55626
16	0.10908	0.28167	2.94752	3.81021
17	0.28306	0.28167	2.44694	3.25716
18	0.50000	0.28167	1.70032	2.56180
19	0.71694	0.28167	1.34030	1.99929
20	0.89092	0.28167	0.85519	1.31711
21	0.98746	0.28167	0.49710	0.87025
22	0.01254	0.39506	3.37411	3.33185
23	0.10908	0.39506	2.74823	3.29924
24	0.28306	0.39506	2.91310	3.38263
25	0.50000	0.39506	2.23847	3.01895
26	0.71694	0.39506	1.62096	2.41337
27	0.89092	0.39506	1.19046	1.84782
28	0.98746	0.39506	0.84065	1.40958
29	0.01254	0.50845	3.14801	3.27958
30	0.10908	0.50845	2.48561	2.97687
31	0.28306	0.50845	[illegible]	3.11611
32	0.50000	0.50845	[illegible]	2.97058
33	0.71694	0.50845	[illegible]	2.52786
34	0.89092	0.50845	[illegible]	2.07387
35	0.98746	0.50845	1.33568	[illegible]
36	0.01254	0.60457	3.57927	3.75339
37	0.10908	0.60457	2.64548	3.46684
38	0.28306	0.60457	3.16288	3.17166
39	0.50000	0.60457	2.51017	2.73678
40	0.71694	0.60457	1.90057	2.30167
41	0.89092	0.60457	1.71102	1.93869
42	0.98746	0.60457	1.64989	1.97779
43	0.01254	0.66880	3.88244	4.17364
44	0.10908	0.66880	2.83116	3.63465
45	0.28306	0.66880	2.91607	2.85413
46	0.50000	0.66880	2.19471	2.18125
47	0.71694	0.66880	1.74204	1.87393
48	0.89092	0.66880	1.52818	1.66452
49	0.98746	0.66880	1.56341	1.72026
50	0.01254	0.72083	3.34378	2.71683
51	0.10908	0.72083	2.49869	2.95268
52	0.28306	0.72083	2.21934	2.29108
53	0.50000	0.72083	1.77894	1.86004
54	0.71694	0.72083	1.58320	1.53741
55	0.89092	0.72083	1.32185	1.36557
56	0.98746	0.72083	1.39750	1.42754
57	0.01254	0.79799	2.07691	2.54211
58	0.10908	0.79799	1.54690	2.18217
59	0.28306	0.79799	1.61848	1.75299
60	0.50000	0.79799	1.43922	1.44992
61	0.71694	0.79799	1.29288	1.17610
62	0.89092	0.79799	1.09784	1.03196
63	0.98746	0.79799	1.15869	1.08607
64	0.01254	0.89337	1.83079	3.24289
65	0.10908	0.89337	1.03131	1.78892
66	0.28306	0.89337	0.98587	1.23025
67	0.50000	0.89337	[illegible]	0.82021
68	0.71694	0.89337	0.66090	0.55336
69	0.89092	0.89337	0.55108	0.44886
70	0.98746	0.89337	0.61093	0.47214
71	0.01254	0.97053	3.27515	4.64585
72	0.10908	0.97053	1.37132	1.92131
73	0.28306	0.97053	1.10493	1.25990
74	0.50000	0.97053	0.92254	0.97859
75	0.71694	0.97053	0.92151	0.84900
76	0.89092	0.97053	0.90027	0.79154
77	0.98746	0.97053	1.02310	0.86100
78	0.02447	0.04184	0.01525	0.01525
79	0.20611	0.04184	0.02160	0.02160
80	0.50000	0.04184	0.01565	0.01565
81	0.79389	0.04184	0.00407	0.00407
82	0.97553	0.04184	-0.00544	-0.00544
83	0.02447	0.14286	0.01037	0.01037
84	0.20611	0.14286	0.06734	0.06734
85	0.50000	0.14286	-0.00726	-0.00726
86	0.79389	0.14286	0.00221	0.00221
87	0.97553	0.14286	-0.00142	-0.00142

88	0.02447	0.24387	0.13145	0.13145
89	0.20611	0.24387	0.04445	0.04445
90	0.50000	0.24387	-0.01680	-0.01680
91	0.79389	0.24387	-0.00082	-0.00082
92	0.97553	0.24387	-0.00033	-0.00033
93	0.02447	0.33356	0.04557	0.04557
94	0.20611	0.33356	0.01757	0.01757
95	0.50000	0.33356	0.00095	0.00095
96	0.79389	0.33356	-0.00744	-0.00744
97	0.97553	0.33356	-0.00188	-0.00188
98	0.02447	0.46429	0.01624	0.01624
99	0.20611	0.46429	0.00853	0.00853
100	0.50000	0.46429	-0.00098	-0.00098
101	0.79389	0.46429	-0.00366	-0.00366
102	0.97553	0.46429	-0.00237	-0.00237
103	0.02447	0.64286	0.00007	0.00007
104	0.20611	0.64286	0.00185	0.00185
105	0.50000	0.64286	-0.00071	-0.00071
106	0.79389	0.64286	-0.00153	-0.00153
107	0.97553	0.64286	-0.00145	-0.00145
108	0.02447	0.82143	0.00894	0.00894
109	0.20611	0.82143	-0.00010	-0.00010
110	0.50000	0.82143	-0.00012	-0.00012
111	0.79389	0.82143	-0.00003	-0.00003
112	0.97553	0.82143	0.00005	0.00005
113	0.02447	0.95215	0.03008	0.03008
114	0.20611	0.95215	0.00241	0.00241
115	0.50000	0.95215	0.00132	0.00132
116	0.79389	0.95215	0.00152	0.00152
117	0.97553	0.95215	0.00181	0.00181

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI
0.12132	1.36114	1.01334	0.35780	0.01325	0.68825
0.18555	1.85942	1.33028	0.41391	0.01579	0.92412
0.28167	2.24090	1.64542	0.25164	0.02004	1.12612
0.39506	2.44258	1.90076	-0.12813	0.02475	1.25905
0.50845	2.41543	2.02175	-0.48892	0.03032	1.28731
0.60457	2.41160	2.14689	-0.74989	0.03706	1.32376
0.66880	2.17146	2.02858	-0.83318	0.04555	1.22207
0.72083	1.76653	1.71173	-0.76846	0.06456	1.01773
0.79799	1.37393	1.28278	-0.64686	0.06593	0.78086
0.89337	0.93763	0.77043	-0.43944	0.06829	0.50750
0.97053	1.15826	1.02720	-0.62435	0.06399	0.64441

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.04184	0.01073	0.01073	0.00000	0.00000	0.00000
0.14286	0.01409	0.01409	0.00000	0.00000	0.00000
0.24387	0.01605	0.01605	0.00000	0.00000	0.00000
0.33356	0.00616	0.00616	0.00000	0.00000	0.00000
0.46429	0.00197	0.00197	0.00000	0.00000	0.00000
0.64286	-0.00024	-0.00024	0.00000	0.00000	0.00000
0.82143	0.00069	0.00069	0.00000	0.00000	0.00000
0.95215	0.00391	0.00391	0.00000	0.00000	0.00000

TOTAL LIFT COEFFICIENT = 1.44403

TOTAL INDUCED DRAG COEFFICIENT = 0.83828

TOTAL PITCHING MOMENT COEFFICIENT = -0.07027

THE WING LIFT COEFFICIENT = 1.44357

THE WING INDUCED DRAG COEFFICIENT = 0.83828

THE WING PITCHING MOMENT COEFFICIENT = -0.07027

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.00046 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.30000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 11.3 THETA 2= 33.8 THETA 3= 56.3 THETA 4= 78.8 THETA 5=101.3
THETA 6=123.8 THETA 7=146.3 THETA 8=168.8 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA
-0.55593	0.12866	-0.27709	-0.67737	-0.79114	-0.49581	0.09197	0.67626	0.94836	
-0.53680	-0.22294	-0.49107	-0.72864	-0.72808	-0.40903	0.12255	0.62496	0.85227	
-0.49929	-0.25103	-0.54646	-0.82304	-0.87118	-0.61528	-0.15518	0.28750	0.48547	
-0.44484	-0.09049	-0.30794	-0.58377	-1.00230	-1.07920	-0.50815	-0.38051	-0.38577	
-0.37553	-0.39340	-0.58301	-1.06308	-3.55113	-2.30212	-0.01704	-0.03485	-0.09051	
-0.29403	-0.73958	-0.90864	-1.37558	-5.96502	-4.27918	0.24050	0.34159	0.33085	
-0.20348	-0.39465	-0.61301	-0.84609	-3.31151	-2.52475	-0.02981	0.04849	0.04063	
-0.10734	-0.68258	-0.98329	-1.37332	-5.12557	-4.01486	0.01960	0.30322	0.36867	
-0.00932	-0.30821	-0.36418	-0.36953	-1.90274	-1.26046	0.23897	0.24646	0.22363	
0.08681	-0.40233	-0.59639	-0.79933	-3.92689	-3.21156	0.05309	0.25858	0.31830	
0.17737	-0.10212	-0.13135	-0.24734	-3.17194	-1.58159	0.41155	0.32033	0.28676	
0.25886	-0.15579	-0.21029	-0.25429	-2.24532	-1.72646	0.24269	0.33815	0.37581	
0.32817	0.11759	0.16809	0.19434	0.21972	0.13538	0.14600	0.24288	0.28385	
0.38263	0.15043	0.18862	0.22392	0.23146	0.22503	0.23425	0.24582	0.24160	
0.42014	-0.13049	-0.03001	0.08601	0.17639	0.26500	0.37219	0.45588	0.47233	
0.43926	-1.29751	-0.40829	0.69095	0.31083	-0.81591	-3.98846	-7.57375	-10.04034	

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 9=348.8 THETA10=326.3 THETA11=303.8 THETA12=281.3 THETA13=258.8
THETA14=236.3 THETA15=213.8 THETA16=191.3 THETA

X/L	THETA 9	THETA10	THETA11	THETA12	THETA13	THETA14	THETA15	THETA16	THETA
-0.55593	0.27264	0.06260	-0.36442	-0.72472	-0.75883	-0.39041	0.22064	0.76291	
-0.53680	-0.12540	-0.26712	-0.54396	-0.74515	-0.68414	-0.31587	0.22564	0.69160	
-0.49929	-0.14292	-0.29622	-0.60779	-0.85960	-0.86108	-0.56178	-0.08405	0.33619	
-0.44484	-0.02857	-0.16057	-0.44046	-0.94387	-1.21671	-0.72589	-0.57866	-0.46607	
-0.37553	-0.40232	-0.60015	-1.06462	-3.66410	-2.24399	0.04843	-0.02598	-0.09069	
-0.29403	-0.71126	-0.82357	-1.29318	-6.30256	-4.56273	0.27779	0.34284	0.32474	
-0.20348	-0.34122	-0.51306	-0.85712	-3.94700	-3.06711	-0.01847	0.08212	0.05805	
-0.10734	-0.57068	-0.76938	-1.36151	-6.05472	-4.97887	-0.04191	0.36373	0.40439	
-0.00932	-0.25666	-0.28480	-0.38266	-2.53685	-1.84409	0.23694	0.21494	0.20486	
0.08681	-0.29382	-0.41878	-0.82782	-4.84349	-4.18599	-0.02986	0.30921	0.35440	
0.17737	-0.06555	-0.09741	-0.27992	-4.01480	-2.36797	0.40618	0.26801	0.25339	
0.25886	-0.13468	-0.18677	-0.36181	-3.03644	-2.47919	0.20480	0.37944	0.40040	
0.32817	0.08070	0.07742	0.10905	0.16402	0.19067	0.15121	0.19022	0.25115	
0.38263	0.10170	0.09322	0.10962	0.13820	0.16697	0.18436	0.20104	0.22218	
0.42014	-0.21024	-0.19487	-0.13011	-0.03206	0.07426	0.18044	0.30058	0.41057	
0.43926	-1.18307	-0.16631	0.84084	0.69115	-1.25615	-4.63122	-8.14244	-10.26743	

XXR,XSTRAK= 5.690000000000000 5.690000000000000
X0,X00= 0.4741666666666667 0.7431163103616407
X0 = 0.4741666666666667

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ONLOCAL RADIUS

X/L	RADIUS	LOADING
0.00241	0.01156	0.97455
0.02153	0.10334	1.41006
0.05904	0.24169	0.96589
0.11349	0.39525	-0.49805
0.18280	0.40000	1.27868
0.26430	0.40000	2.55815
0.35486	0.40000	1.22051
0.45099	0.40000	2.32980
0.54901	0.40000	1.11538
0.64514	0.40000	1.50933
0.73570	0.40000	1.08086
0.81720	0.40000	1.08927
0.88651	0.40000	0.18517
0.94096	0.40000	0.15567
0.97847	0.40000	0.93684
0.99759	0.40000	0.46842

SECTIONAL SIDE FORCE LOADING

X/L	RADIUS	LOADING
0.00241	0.01156	-0.14811

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0.02153   0.10334   -0.22142
0.05904   0.24169   -0.17876
0.11349   0.39525   -0.06504
0.18280   0.40000   -0.00274
0.26430   0.40000   -0.17959
0.35486   0.40000   -0.41898
0.45099   0.40000   -0.67420
0.54901   0.40000   -0.46102
0.64514   0.40000   -0.70385
0.73570   0.40000   -0.64367
0.81720   0.40000   -0.62446
0.88651   0.40000   -0.06291
0.94096   0.40000   -0.14770
0.97847   0.40000   -0.36762
0.99759   0.40000   -0.18381

   THE FUSELAGE POTENTIAL LIFT COEFFICIENT =  0.13088

   THE FUSELAGE POTENTIAL MOMENT COEFFICIENT =  0.02161

   THE FUSELAGE INDUCED DRAG COEFFICIENT =  0.06529
   (NOTE. BASE DRAG IS NOT INCLUDED)

HE FOLLOWING VALUES ARE OBTAINED BY IGNORING
HE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

   THE FUSELAGE LIFT COEFFICIENT =  0.06824

   THE FUSELAGE MOMENT COEFFICIENT =  0.03771

   THE FUSELAGE INDUCED DRAG COEFFICIENT =  0.03650

   FUSELAGE VORTEX LIFT =

   CLVF =  0.00039  CDVF =  0.00020  CMVF =  0.00004
 CNB FROM L.S.=  0.03425 FUSELAGE CNB =  -0.05678
 CYB FROM L.S. =  -0.73381 FUSELAGE CYB =  -0.18514
*************************************

 SUMMARY OF RESULTS AT ALPHA =  30.000  DEG.  M =  0.100
*************************************

  CL(LS) =  1.44403   CLF =  0.07735   CL =  1.52138

  CDI(LS)=  0.83828   CDF =  0.03650   CDVIS =  0.01056   CD =  0.88534

  CM(LS) =  -0.07027   CMF =  0.03771   CM =  -0.03256
*************************************

 THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
   A REFERENCE SPAN OF   8.10000  AND A REFERENCE AREA OF  37.64000

   PBAR =  0.01000  BETA =  0.08000
*************************************

 * SUMMARY OF STABILITY DERIVATIVES *
*************************************


 ***STABILITY DERIVATIVES EVALUATED AT ALPHA =  30.000  DEGREES
   AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

   CYB =  -0.9189457  CLB =  -0.4101331  CNB =  -0.0225332


 ***STABILITY DERIVATIVES BASED ON STABILITY AXES***

   CYB =  -0.9189457  CLB =  -0.3664522  CNB =  0.1855522

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
            WHERE S =  37.64000  AND B/2 =   4.05000

      Y/S         BM(RIGHT)     BM(LEFT)
    0.12132       0.27190       0.21661
    0.18555       0.19835       0.16110
    0.28167       0.11476       0.09646
    0.39506       0.05273       0.04623
    0.50845       0.02078       0.01891
    0.60457       0.00825       0.00761
```

0.66880	0.00440	0.00405
0.72083	0.00255	0.00232
0.79799	0.00097	0.00087
0.89337	0.00022	0.00020
0.97053	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.300842 (RIGHT), = 0.238385 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 37.64000 AND B/2 = 1.40000

*** TAIL SURFACE 1 ***

0.04184	0.00005	0.00005
0.14286	0.00002	0.00002
0.24387	0.00001	0.00001
0.33356	0.00000	0.00000
0.46429	0.00000	0.00000
0.64286	0.00000	0.00000
0.82143	0.00000	0.00000
0.95215	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000064 (RIGHT), = 0.000064 (LEFT)

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.22146
0.14645	0.77411
0.37059	0.69371
0.62941	0.66916
0.85355	0.62891
0.98296	0.62941

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00255
0.20611	0.01052
0.50000	0.01269
0.79389	0.01474
0.97553	0.01498

IP SUCTION COEFFICIENT = 0.01782 (ONE SIDE ONLY)

HE X-COORDINATE OF CENTROID OF TIP SUCTION = -3.31416

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.01704	0.11469
0.14645	0.42801
0.37059	0.41413
0.62941	0.39245
0.85355	0.35477
0.98296	0.34942

CHORDWISE DISTRIBUTION OF TIP SUCTION COEFFICIENT

X/C	CTIP
0.02447	0.00255
0.20611	0.01052
0.50000	0.01269
0.79389	0.01474
0.97553	0.01498

IP SUCTION COEFFICIENT = 0.01034 (ONE SIDE ONLY)

HE X-COORDINATE OF CENTROID OF TIP SUCTION = -3.32218

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PRESSURE DISTRIBUTION AT ALPHA = 30.000 DEG.

AT ITERATION NUMBER = 8

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

*** THE FOLLOWING ARE RESULTS WITH VORTEX BREAKDOWN ***

VORTEX	XV	YV	CP(LEFT)	CP(RIGHT)
1	0.01254	0.12132	0.71252	1.67289
2	0.10908	0.12132	1.39413	1.76736
3	0.28306	0.12132	1.67075	1.94486
4	0.50000	0.12132	1.14328	1.34678
5	0.71694	0.12132	1.06368	1.09306
6	0.89092	0.12132	0.73371	0.82874
7	0.98746	0.12132	0.31930	0.26951
8	0.01254	0.18555	3.52368	3.33374
9	0.10908	0.18555	2.34983	3.40952
10	0.28306	0.18555	1.76791	2.48234
11	0.50000	0.18555	1.28412	1.79952
12	0.71694	0.18555	1.20216	1.40581
13	0.89092	0.18555	0.76898	0.97347
14	0.98746	0.18555	0.41849	0.46836
15	0.01254	0.28167	3.75465	3.45270
16	0.10908	0.28167	2.95324	3.62584
17	0.28306	0.28167	2.36516	2.84014
18	0.50000	0.28167	1.62116	2.13051
19	0.71694	0.28167	1.30908	1.69884
20	0.89092	0.28167	0.81691	1.08154
21	0.98746	0.28167	0.47500	0.69931
22	0.01254	0.39506	3.30181	2.90755
23	0.10908	0.39506	2.65443	2.88820
24	0.28306	0.39506	2.74915	2.79580
25	0.50000	0.39506	2.11097	2.46545
26	0.71694	0.39506	1.56562	1.97917
27	0.89092	0.39506	1.13401	1.45879
28	0.98746	0.39506	0.79890	1.08283
29	0.01254	0.50845	2.96336	2.62083
30	0.10908	0.50845	2.30431	2.42233
31	0.28306	0.50845	2.78099	2.43887
32	0.50000	0.50845	2.24127	2.37406
33	0.71694	0.50845	1.72298	2.04680
34	0.89092	0.50845	1.49284	1.60484
35	0.98746	0.50845	1.26167	1.40765
36	0.01254	0.60457	3.26305	2.79486
37	0.10908	0.60457	2.36613	2.66208
38	0.28306	0.60457	2.98636	2.43555
39	0.50000	0.60457	2.31040	2.19676
40	0.71694	0.60457	1.78288	1.85856
41	0.89092	0.60457	1.62398	1.48883
42	0.98746	0.60457	1.55930	1.48796
43	0.01254	0.66880	3.49407	3.07934
44	0.10908	0.66880	2.54127	2.85021
45	0.28306	0.66880	2.67750	2.24415
46	0.50000	0.66880	2.02729	1.78721
47	0.71694	0.66880	1.62811	1.52322
48	0.89092	0.66880	1.44737	1.26640
49	0.98746	0.66880	1.47381	1.30092
50	0.01254	0.72083	3.21204	2.32111
51	0.10908	0.72083	2.36203	2.88165
52	0.28306	0.72083	2.05266	2.07839
53	0.50000	0.72083	1.67935	1.64307
54	0.71694	0.72083	1.48821	1.22877
55	0.89092	0.72083	1.24709	1.06032
56	0.98746	0.72083	1.31147	1.06960
57	0.01254	0.79799	1.94052	2.43033
58	0.10908	0.79799	1.43249	2.18570
59	0.28306	0.79799	1.52550	1.62469
60	0.50000	0.79799	1.36031	1.31751
61	0.71694	0.79799	1.21358	0.95745
62	0.89092	0.79799	1.02754	0.91093
63	0.98746	0.79799	1.08492	0.82142
64	0.01254	0.89337	1.74878	2.99728
65	0.10908	0.89337	0.95913	1.74739
66	0.28306	0.89337	0.94782	1.17783
67	0.50000	0.89337	0.74115	0.74333

68	0.71694	0.89337	0.61251	0.46491
69	0.89092	0.89337	0.51293	0.35011
70	0.98746	0.89337	0.56831	0.36630
71	0.01254	0.97053	3.06905	4.32074
72	0.10908	0.97053	1.15444	1.87455
73	0.28306	0.97053	0.88448	1.24430
74	0.50000	0.97053	0.70842	0.95842
75	0.71694	0.97053	0.70108	0.82036
76	0.89092	0.97053	0.69154	0.75090
77	0.98746	0.97053	0.79830	0.81244
78	0.02447	0.04184	-0.02239	-0.02239
79	0.20611	0.04184	0.00065	0.00065
80	0.50000	0.04184	0.00794	0.00794
81	0.79389	0.04184	0.00374	0.00374
82	0.97553	0.04184	-0.00455	-0.00455
83	0.02447	0.14286	-0.01660	-0.01660
84	0.20611	0.14286	0.03294	0.03294
85	0.50000	0.14286	-0.00636	-0.00636
86	0.79389	0.14286	0.00191	0.00191
87	0.97553	0.14286	-0.00092	-0.00092
88	0.02447	0.24387	0.02074	0.02074
89	0.20611	0.24387	0.01748	0.01748
90	0.50000	0.24387	-0.01448	-0.01448
91	0.79389	0.24387	-0.00014	-0.00014
92	0.97553	0.24387	-0.00004	-0.00004
93	0.02447	0.33356	0.00564	0.00564
94	0.20611	0.33356	0.00915	0.00915
95	0.50000	0.33356	0.00029	0.00029
96	0.79389	0.33356	-0.00598	-0.00598
97	0.97553	0.33356	-0.00108	-0.00108
98	0.02447	0.46429	-0.00136	-0.00136
99	0.20611	0.46429	0.00323	0.00323
100	0.50000	0.46429	-0.00116	-0.00116
101	0.79389	0.46429	-0.00255	-0.00255
102	0.97553	0.46429	-0.00140	-0.00140
103	0.02447	0.64286	0.00493	0.00493
104	0.20611	0.64286	0.00019	0.00019
105	0.50000	0.64286	-0.00060	-0.00060
106	0.79389	0.64286	-0.00073	-0.00073
107	0.97553	0.64286	-0.00057	-0.00057
108	0.02447	0.82143	0.02799	0.02799
109	0.20611	0.82143	0.00087	0.00087
110	0.50000	0.82143	0.00048	0.00048
111	0.79389	0.82143	0.00062	0.00062
112	0.97553	0.82143	0.00075	0.00075
113	0.02447	0.95215	0.05397	0.05397
114	0.20611	0.95215	0.00533	0.00533
115	0.50000	0.95215	0.00248	0.00248
116	0.79389	0.95215	0.00222	0.00222
117	0.97553	0.95215	0.00248	0.00248

Y/S	CL(RIGHT)	CL(LEFT)	CM	CT	CDI
0.12132	1.31998	1.01002	0.36541	0.01325	0.67541
0.18555	1.73387	1.32585	0.42203	0.01579	0.88660
0.28167	1.96871	1.60812	0.25423	0.02004	1.03678
0.39506	2.02682	1.81445	-0.10181	0.02475	1.11411
0.50845	1.92408	1.88212	-0.41736	0.03032	1.10516
0.60457	1.88545	1.97706	-0.63915	0.03706	1.12284
0.66880	1.71794	1.86874	-0.71342	0.04555	1.04501
0.72083	1.55490	1.61153	-0.69199	0.06456	0.92771
0.79799	1.24482	1.20582	-0.59082	0.06593	0.72137
0.89337	0.86583	0.72994	-0.40751	0.06829	0.47509
0.97053	1.11985	0.83819	-0.55544	0.06399	0.57876

THE FOLLOWING ARE THE TAIL CHARACTERISTICS

*** TAIL SURFACE 1 ***

0.04184	0.00086	0.00086	0.00000	0.00000	0.00000
0.14286	0.00447	0.00447	0.00000	0.00000	0.00000
0.24387	0.00162	0.00162	0.00000	0.00000	0.00000
0.33356	0.00116	0.00116	0.00000	0.00000	0.00000
0.46429	-0.00040	-0.00040	0.00000	0.00000	0.00000
0.64286	0.00008	0.00008	0.00000	0.00000	0.00000
0.82143	0.00287	0.00287	0.00000	0.00000	0.00000
0.95215	0.00708	0.00708	0.00000	0.00000	0.00000

*** THE FOLLOWING ARE RESULTS WITH VORTEX BREAKDOWN ***

TOTAL LIFT COEFFICIENT = 1.30536

TOTAL INDUCED DRAG COEFFICIENT = 0.75842

TOTAL PITCHING MOMENT COEFFICIENT = -0.04231

THE WING LIFT COEFFICIENT = 1.30525

THE WING INDUCED DRAG COEFFICIENT = 0.75842

THE WING PITCHING MOMENT COEFFICIENT = -0.04231

*** TAIL SURFACE 1 ***

THE TAIL LIFT COEFFICIENT = 0.00012 (BASED ON WING AREA)

THE TAIL INDUCED DRAG COEFFICIENT = 0.00000 (BASED ON WING AREA)

THE TAIL PITCHING MOMENT COEFFICIENT BASED ON REFERENCE WING AREA

AND MEAN WING CHORD, AND REFERRED TO THE Y-AXIS = 0.00000

(NOTE. THE INDUCED DRAG COMPUTATION IS FOR SYMMETRICAL LOADING ONLY)

FUSELAGE AERODYNAMIC CHARACTERISTICS ARE GIVEN BELOW

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 1= 11.3 THETA 2= 33.8 THETA 3= 56.3 THETA 4= 78.8 THETA 5=101.3
THETA 6=123.8 THETA 7=146.3 THETA 8=168.8 THETA

X/L	THETA 1	THETA 2	THETA 3	THETA 4	THETA 5	THETA 6	THETA 7	THETA 8	THETA
-0.55593	0.12571	-0.28500	-0.69262	-0.81160	-0.51596	0.07789	0.67081	0.94941	
-0.53680	-0.22809	-0.49970	-0.74241	-0.74512	-0.42481	0.11261	0.62270	0.85566	
-0.49929	-0.25296	-0.55231	-0.83450	-0.88609	-0.62878	-0.16234	0.28883	0.49316	
-0.44484	-0.08649	-0.30656	-0.58721	-1.01738	-1.09548	-0.50814	-0.37519	-0.37797	
-0.37553	-0.38629	-0.57919	-1.06987	-3.64795	-2.35546	0.01165	-0.00424	-0.06090	
-0.29403	-0.70478	-0.85924	-1.32279	-6.12766	-4.43802	0.29459	0.39949	0.38460	
-0.20348	-0.30934	-0.48586	-0.70306	-3.26938	-2.55015	0.04552	0.12135	0.10510	
-0.10734	-0.58253	-0.81417	-1.20211	-5.19889	-4.25664	0.02071	0.33211	0.40311	
-0.00932	-0.24252	-0.26583	-0.26972	-1.84481	-1.33848	0.27917	0.28227	0.23756	
0.08681	-0.33743	-0.47764	-0.68363	-3.98762	-3.48233	-0.01753	0.21320	0.28493	
0.17737	-0.07509	-0.10547	-0.22765	-3.18070	-1.74704	0.09161	0.30390	0.24975	
0.25886	-0.13878	-0.18467	-0.25072	-2.43521	-2.02559	0.16073	0.27505	0.32284	
0.32817	0.11083	0.15524	0.17871	0.21101	0.14728	0.15489	0.22639	0.24511	
0.38263	0.13021	0.16286	0.19434	0.20798	0.20867	0.21383	0.21601	0.20584	
0.42014	-0.16488	-0.06061	0.06530	0.17584	0.27966	0.38311	0.45198	0.45469	
0.43926	-1.44588	-0.49823	0.67863	0.83790	-0.83742	-4.15044	-7.90997	-10.50251	

PRESSURE DISTRIBUTION AT THETA-LOCATIONS IN DEGREES DEFINED BELOW

THETA 9=348.8 THETA10=326.3 THETA11=303.8 THETA12=281.3 THETA13=258.8
THETA14=236.3 THETA15=213.8 THETA16=191.3 THETA

X/L	THETA 9	THETA10	THETA11	THETA12	THETA13	THETA14	THETA15	THETA16	THETA
-0.55593	0.26938	0.05418	-0.37951	-0.74370	-0.77628	-0.40141	0.21759	0.76486	
-0.53680	-0.13081	-0.27594	-0.55674	-0.75949	-0.69607	-0.32206	0.22594	0.69587	
-0.49929	-0.14506	-0.30235	-0.61880	-0.87274	-0.87156	-0.56550	-0.08002	0.34490	
-0.44484	-0.02469	-0.15898	-0.44237	-0.95549	-1.22926	-0.72379	-0.57256	-0.45815	
-0.37553	-0.39467	-0.59610	-1.07494	-3.77984	-2.31866	0.06988	-0.00056	-0.06315	
-0.29403	-0.68378	-0.79849	-1.28488	-6.53704	-4.74853	0.32142	0.39017	0.37394	
-0.20348	-0.28513	-0.46137	-0.30641	-3.99922	-3.09057	0.05035	0.14619	0.11954	
-0.10734	-0.53313	-0.75337	-1.36064	-6.25748	-5.12033	0.02052	0.42535	0.45108	
-0.00932	-0.23113	-0.26889	-0.36005	-2.56116	-1.82229	0.26777	0.22047	0.20733	
0.08681	-0.28832	-0.43468	-0.85212	-5.02327	-4.28666	0.01137	0.33172	0.34717	
0.17737	-0.05681	-0.08629	-0.26602	-4.09054	-2.41734	0.40070	0.22863	0.20566	
0.25886	-0.13059	-0.19067	-0.38190	-3.20546	-2.62976	0.19586	0.36547	0.36700	
0.32817	0.07479	0.07011	0.09960	0.14522	0.17707	0.12733	0.15037	0.20421	
0.38263	0.08642	0.07630	0.08937	0.11773	0.14956	0.16629	0.17567	0.18874	
0.42014	-0.24059	-0.22520	-0.15579	-0.05036	0.06240	0.16868	0.28267	0.38849	
0.43926	-1.32985	-0.25225	0.82822	0.70043	-1.31529	-4.83860	-8.51670	-10.74440	

XXR,XSTRAK= 5.690000000000000 5.690000000000000
X0,X00= 0.4741666666666667 0.7431163103616407
X0 = 0.4741666666666667

TOTAL PRESSURE LOADING AT EACH X-STATION, BASED ONLOCAL RADIUS

X/L	RADIUS	LOADING
0.00241	0.01156	0.98141
0.02153	0.10334	1.42364
0.05904	0.24169	0.98195
0.11349	0.39525	-0.49105
0.18280	0.40000	1.33188
0.26430	0.40000	2.59586
0.35486	0.40000	1.18708
0.45099	0.40000	2.24527
0.54901	0.40000	1.04465
0.64514	0.40000	1.38914
0.73570	0.40000	0.98129
0.81720	0.40000	0.99245
0.88651	0.40000	0.14941
0.94096	0.40000	0.14186
0.97847	0.40000	0.97083
0.99759	0.40000	0.48542

SECTIONAL SIDE FORCE LOADING

X/L	RADIUS	LOADING
0.00241	0.01156	-0.14520
0.02153	0.10334	-0.21712
0.05904	0.24169	-0.17514
0.11349	0.39525	-0.06100
0.18280	0.40000	-0.02297
0.26430	0.40000	-0.24412
0.35486	0.40000	-0.50769
0.45099	0.40000	-0.75113
0.54901	0.40000	-0.51106
0.64514	0.40000	-0.71049
0.73570	0.40000	-0.63237
0.81720	0.40000	-0.53829
0.88651	0.40000	-0.08975
0.94096	0.40000	-0.13967
0.97847	0.40000	-0.39673
0.99759	0.40000	-0.19836

THE FUSELAGE POTENTIAL LIFT COEFFICIENT = 0.12659

THE FUSELAGE POTENTIAL MOMENT COEFFICIENT = 0.02319

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.06276
(NOTE. BASE DRAG IS NOT INCLUDED)

HE FOLLOWING VALUES ARE OBTAINED BY IGNORING
HE AFT VISCOSITY-DOMINATED REGION. SEE DATCOM

THE FUSELAGE LIFT COEFFICIENT = 0.06814

THE FUSELAGE MOMENT COEFFICIENT = 0.03811

THE FUSELAGE INDUCED DRAG COEFFICIENT = 0.03642

FUSELAGE VORTEX LIFT =

CLVF = 0.00039 CDVF = 0.00020 CMVF = 0.00004
CNB FROM L.S.= -0.01195 FUSELAGE CNB = -0.06710
CYB FROM L.S. = -0.23481 FUSELAGE CYB = -0.21796
****

SUMMARY OF RESULTS AT ALPHA = 30.000 DEG. M = 0.100
****

CL(LS) = 1.30536 CLF = 0.07722 CL = 1.38258

CDI(LS)= 0.75842 CDF = 0.03642 CDVIS = 0.01056 CD = 0.80540

CM(LS) = -0.04231 CMF = 0.03811 CM = -0.00420
****

THE FOLLOWING ROLLING AND YAWING MOMENTS ARE BASED ON
A REFERENCE SPAN OF 8.10000 AND A REFERENCE AREA OF 37.64000

PBAR = 0.01000 BETA = 0.08000
****

* SUMMARY OF STABILITY DERIVATIVES *
****

***STABILITY DERIVATIVES EVALUATED AT ALPHA = 30.000 DEGREES
AND AT MACH NO.= 0.10, BASED ON BODY AXES (IN PER RADIAN)***

CYB = -0.4527724 CLB = -0.1661582 CNB = -0.0790516

STABILITY DERIVATIVES BASED ON STABILITY AXES

CYB = -0.4527724 CLB = -0.1834230 CNB = 0.0146184

THE FOLLOWING BENDING MOMENT COEFFICIENT IS BASED ONQ*S*(B/2),
WHERE S = 37.64000 AND B/2 = 4.05000

Y/S	BM(RIGHT)	BM(LEFT)
0.12132	0.22724	0.20475
0.18555	0.16416	0.15150
0.28167	0.09411	0.09004
0.39506	0.04334	0.04283
0.50845	0.01755	0.01745
0.60457	0.00729	0.00701
0.66880	0.00401	0.00371
0.72083	0.00235	0.00211
0.79799	0.00091	0.00076
0.89337	0.00021	0.00017
0.97053	0.00001	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE WING ROOT = 0.252362 (RIGHT), = 0.225724 (LEFT)

THE FOLLOWING ARE THE TAIL CHARACTERISTICS BASED ON WING AREA,
WHERE S = 37.64000 AND B/2 = 1.40000

*** TAIL SURFACE 1 ***

0.04184	0.00002	0.00002
0.14286	0.00001	0.00001
0.24387	0.00001	0.00001
0.33356	0.00001	0.00001
0.46429	0.00001	0.00001
0.64286	0.00000	0.00000
0.82143	0.00000	0.00000
0.95215	0.00000	0.00000

THE BENDING MOMENT COEFFICIENT BASED ON WING HALF SPAN AND WING AREA
AT THE TAIL ROOT = 0.000022 (RIGHT), = 0.000022 (LEFT)

APPENDIX B

PLOTTING PROGRAM USING DI3000 - XPM

SAMPLE PLOTTING INPUT AND OUTPUT FOR F-16XL CONFIGURATION

SAMPLE PLOTTING INPUT AND OUTPUT FOR F5 CONFIGURATION

```
c      3 -D GRAPHICS PROGRAM FOR NAPDA,VORSTAB CODES
c
c*********************************************
c                                                c
c        WRITTEN BY : R. K. TRIPATHI              c
c               VIGYAN RESEARCH ASSOCIATES INC.   c
c               30 RESEARCH DR.                   c
c               HAMPTON, VA 23666                 c
c                 (804) 865-0794                  c
c                                                c
c*********************************************
c

c**** This program uses the same input as the VORSTAB/NAPDA code and
c**** introduces two lines for plot options explained below.


      parameter (ip=2)
c        IMPLICIT REAL*8 (A-H,O-Z)
      common /stp/ istop
      common /itrak/ itrake(ip),naero,ispan,iters,nconts,mite,ipunch
      common /fusrad/ ifr,ifn,xff(21),rff(21),aaf(20),bbf(20),ccf(20),
     1ddf(20)
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),
     1CSF(5,20),XAS(6),F0,F10,WKN,RDX,X1,NCUM,NF,NT,NKF(5),KF,NTL,LWF
      common /plot/iplot,IPLE,IPWAK,IPTIP,ipwings,ipfslg,iforbody
      COMMON /LEDSUF/ BSQD4P,NSUF,LEV,JB,ITER,XEND(IP)
      common /latle/lite,lca,nq1,nq2,latt,irea,mql
      COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(250),CREF,BREF2,LAT
      COMMON/SRCT/ISYM,JSCT,TSF(21,21),RSF(21,21)
      COMMON /FORBOD/ IFORB
      character*5 am,alpha,angl
      character*80 title
      character*2 label(11)
      character*4 aaa(20)
      data label(1),label(2),label(3),label(4)  /'0','1','2','3'/
      data label(5),label(6),label(7),label(8) /'4','5','6','7'/
      data label(9),label(10),label(11) /'8','9','10'/

c***   The following data line should be matched with the corresponding
c***   output data file.
      data am,alpha,angl / '0.1  ','35.  ','5.   ' /

  420 format (a80)
  421 format (20x,13a6)
  530 format (20a4)
      call jbegin
      call jminit
      call jdinit (1)
      call jdevon (1)
      inpt = 5
      read(inpt,420) title
      call gemtry

c**** This is the first input plot option. iplot =1 for all plot options.
c**** For the rest give 1 for plotting, 0 for not plotting. ihide is for
c**** hidden lines removal, and iforbody for plotting forebody vortices.

      read (inpt,530) aaa
      read (inpt,*) iplot,IPLE,IPWAK,IPTIP,ipwings,ipfslg,ihide,iforbody

c**** This is the second plot option. This is used for the view desired.
c**** In general larger values of ze and va (view angle) will zoom out
c**** the picture and it will be smaller.r is the reference point looked at,
c**** and e refers to the location of eye.

      read (inpt,530) aaa
      read (inpt,*) xr,yr,zr,xe,ye,ze,va
  100 format (1x,8f12.4)

      do 1 itr=1,lite
      call jcview (xr,yr,zr,xe,ye,ze,va)
      call jwclip (.true.)
      if (ifn.eq.0 ) go to 110
      if ( ifn .ne. 0 .and.  kf.eq.1) then
      if (xe.lt.xff(1).or.xe.gt.xff(ifn)) call jupvec (0.,0.,1.)
      end if
  110 continue
      if (abs(ye).gt.0.0.or.xe.lt.0.0) call jupvec (0.,0.,1.)
      call jright (.true.)
```

```
          call jopen
c          if (lat .eq. 0 ) call vortex
c          if (lat .eq. 1 ) call invlatt
          if (lat.eq.1)    call nnvortex
          if ( iforbody .eq . 1 ) call forintp
          call jlstyl (0)
          if ( ipfslg .eq. 1 .and. isym .eq. 0 ) call flgunsym
          call jclose
          if (itr.gt.1.and.itr.lt.lite) go to 1
          call jopen
          if ( ihide .eq. 0 ) go to 201
          call jbscn (.true.,.true.,.true.)
          call jrbfp(.false.)
  201     continue
          if (ipwings .eq. 0 ) go to 21
          call wings
   21     continue
          if (ipfslg .eq. 0 ) go to 22
          if (kf.eq.1.and.ifn.gt.0) call fuselg
          if (kf.eq.1.and.ifn.eq.0) call flgcal
   22     continue
          call jclose
          if ( ihide .eq. 0 ) go to 202
          call jescn (0)
  202     continue
C***************************
    2     continue
          call jright (.false.)
          call jwindo (-1.,1.,-1.,1.)
          call jvport (-1.,1.,-1.,1.)
          call jcview (0.,0.,0.,0.,+1.,-10.,0.0)
          call jopen
          call jsize (0.035,0.035)
          call jmove (-0.45,-0.55)
          if ( iple.eq.0 .and. ipwak.eq.0 .and. iptip.eq.0 ) go to 51
          call jhstrg ('Iteration # ')
          call jmove (-0.1,-0.55)
          do 5 j=1,11
          jj=j-1
          if (iter.eq.jj) call jhstrg (label(j))
    5     continue
   51     continue
          cx=-0.95
          cy=-0.95
          call jmove (cx,cy)
          call jhstrg ( title )
          if ( iple.eq.0 .and. ipwak.eq.0 .and. iptip.eq.0 ) go to 511
          cy = cy + 0.15
          call jmove (-0.8,cy)
          call jhstrg ('[FONT=9][BLC]a[ELC]=')
           call jrmove (0.10,0.)
          call jhstrg (alpha)
          call jrmove (0.25,0.)
          call jhstrg ('M = ')
          call jrmove (0.15,0.)
          call jhstrg (am)
          call jrmove (0.25,0.)
          call jhstrg ('[FONT=9][BLC]b[ELC]=')
          call jrmove (0.10,0.)
          call jhstrg (angl)
          cxx=0.15
          cyy= cy + 0.15
          call jsize (0.025,0.025)
          cxx = -0.9
          if (iple.eq.0) go to 12
          call jlstyl (0)
          call jlwide (16383)
          call jmove (cxx,cyy)
          call jrdraw (.2,0.)
          call jrmove (.1,0.)
          call jhstrg ('Leading-edge vortex filaments')
   12     continue
          if (ipwak.eq.0) go to 13
          call jlstyl (1)
          call jlwide (16383)
          cyy=cyy-0.045
          call jmove (cxx,cyy)
          call jrdraw (.2,0.)
          call jrmove(.1,0.)
          call jhstrg ('Wake vortex elements')
```

```
   13 continue
      if (iptip.eq.0) go to 14
      call jlstyl (2)
      call jlwide (16383)
      cyy=cyy-0.045
      call jmove (cxx,cyy)
      call jrdraw (.2,0.)
      call jrmove (.1,0.)
      call jhstrg ('Tip vortex elements')
   14 continue

c*************************************

      if ( iforbody .eq. 0 ) go to 511
      cyy = cyy - 0.045
      call jmove (cxx,cyy)
      call jlstyl (3)
      call jlwide (16383)
      call jrdraw (0.2,0. )
      call jrmove (0.1, 0.)
      call jhstrg ('Initial forebody vortices')
c*************************************
  511 continue
      call jclose
C*******************
      call jpause (1)
      call jframe
      if (istop.eq.1) go to 4
 1    continue
 4    continue
      call jdevof (1)
      call jdend  (1)
      call jend
      call jmterm
      stop
      end
c  ****************************-***

      subroutine wings
c  **********************************
c         IMPLICIT REAL*8 (A-H,O-Z)
      dimension x(4),y(4),z(4)
      common /plt/pxxl(10,2),pxxt(10,2),pyl(10,2),pzs(10),pdihed(10)
      common /ktw/kount
      common /sss/ nasym,nsur,lpanel,icamb,nums,iagvx,naug,ibd,idih,
     *irl,kt,ncl,nc2,iblc,pt,pbk,pis,alpinc,pi,alq,alz
      pi=3.14159265
       do 1 nw=1,kount
  100 format (3x,8f12.4)
      dihed=pdihed(nw)*pi/180.
      x(1)=pxxl(nw,1)
      y(1)=pyl(nw,1)
      z(1)=pzs(nw)
      x(2)=pxxt(nw,1)
      y(2)=pyl(nw,1)
      z(2)=pzs(nw)
      x(4)=pxxl(nw,2)
      y(4)=pyl(nw,1)+(pyl(nw,2)-pyl(nw,1))* cos(dihed)
      z(4)=pzs(nw)+(pyl(nw,2)-pyl(nw,1))*sin(dihed)
      x(3)=pxxt(nw,2)
      y(3)=pyl(nw,1)+(pyl(nw,2)-pyl(nw,1))*cos(dihed)
      z(3)=pzs(nw)+(pyl(nw,2)-pyl(nw,1))*sin(dihed)
      call jopst('fa3d')
c***      call jcolor (1)
      call jlwide(32767)
      call jfa3 (4,x,y,z)
      call jclst ('fa3d')
      call jtrvst ('fa3d')
c **************************
      y(1)=-y(1)
      y(2)=-y(2)
      y(3)=-y(3)
      y(4)=-y(4)
      call jopst('fa3d')
      call jfa3 (4,x,y,z)
      call jclst ('fa3d')
      call jtrvst ('fa3d')
cc***********************************
 1    continue
      return
```

```
        end
C***************************************
        subroutine fuselg
c          IMPLICIT REAL*8 (A-H,O-Z)
        common /fusrad/ ifr,ifn,x(21),rad(21),aaf(20),bbf(20),ccf(20),
       1ddf(20)
        dimension p1(25),p2(25),p3(25),p4(25),p5(25),p6(25)
  100   format (1x,8f12.4)
        d=0.
        ifn1=ifn-1
        do 1 i=1,ifn1
        rad2=rad(i+1)
        rad1=rad(i)
        d1=x(i+1)-x(i)
        xc1=0.5*d1
        xc2=xc1+d
        d=d+d1
        p1(i)=xc2
        p2(i)=0.0
        p3(i)=0.0
        p4(i)=rad2
        p5(i)=rad1
        p6(i)=d1
    1   continue
        call jopst ('cylin')
        do 2 j=1,ifn1
        call jsedfl (1)
c***        call jcolor (1)
        call jcylin (p1(j),p2(j),p3(j),p4(j),p5(j),p6(j),12,0)
    2   continue
        call jclst ('cylin')
        call jtrvst ('cylin')
        return
        end
C*****************************

        SUBROUTINE GEMTRY
c         IMPLICIT REAL*8 (A-H,O-Z)
        PARAMETER (IDM=250)
        PARAMETER (IDM1=(IDM+20)*2)
        PARAMETER (IDM2=4*IDM1)
        PARAMETER (IPL=2,IPS=80,IPD=15,IPC=50)
        PARAMETER (IDFC=20,IDFL=20)
        PARAMETER (IDF2=IDFC*2)
        DIMENSION XXL(2),YL(2),XXT(2),CPCWL(16),CPSWL(31),AW(50),CA(50)
        DIMENSION XL1(440),YL1(440),NSP3(6),ITIPV(6),YEND(6)
        DIMENSION DELTA(6),DELT(6),CPCL(18)
        DIMENSION XDV(4),YDV(4),ZDV(4)
        DIMENSION FUSX(21),FUSY(21),FUS1(21),FUS2(21)
        DIMENSION SURA(10),CBAR(10)
        CHARACTER*4 AAA(20)
        COMMON /THCKS/ ITHCK(4),NST(4),LTH(4,10),XH(4,10,21),
       1YH(4,10),CHTD(4,10),ZBT(IDM
       2),ZTDX(IDM),ZTYY(IDM),ZTLE(50),ZLEX(50),ZLEY(50),DL(IDM),SQA(IDM)
       3,SIG(IDM)
C
        COMMON /VBDN/ YBAR(6,2),YCMX(6,2),YBR(6,2),YBRBR(6,
       12),YBRBL(6,2),YD2(6,2),YDR2(6,2),YDL2(6,2),ABD(6,2),ABDR(6,2)
       1,ABDL(6,2),YREF(6),YCBR(6,2),YCBL(6,2),ICOUNT,MSTP(6)
        COMMON /DSL/ CTP(6,2),CHORDT(6,4),SCH(IDM),CREF,BREF2,LAT
        COMMON /SCHEME/ C(2),X(15,51),Y(15,51),SLOPE(15),XL(2,15),XTT(51),
       1XLL(51),SWLP(100),XLEE(100)
        COMMON /AERO/ AM,B,CL(50),CT(50),CD(50),CM(50)
        COMMON /CONST/ NCS,NCW,M1(6,5),MJW1(6,2,5),MJW2(6,2,5),NJW(6,5),
       1NFP(6),NW(6,2)
        COMMON /CAMB/ ICAM(6),IM(6,10),XT(6,10,21),
       1YT(6,10),CURV(6,10),CHND(6,10)
        COMMON /EXTRA/ LPN(6),NS(6),ICNLE(6),ITWST(6),IST(6),NGRD,
       1NC(6),NWING(6),IPOS(6),IALP,DUMT(3,6,15),HALFBH(6),HEIGHT,ATT
        COMMON/BETA/ GMAX(50),XTG(50),YTG(50),ZTG(50),B2,CTG(15),STG(1
       15),DIST,P,BK,RL,CFF(10),CFF1(10),NCG
        COMMON /LEFLP/ YLEF(6,10,2),XNF(6,10),YNF(6,10),ZNF(6,10),XLF(6,10
       1,4),YLF(6,10,4),SLP1(6,10)
        COMMON /TWST1/ NYM(6),YTS(6,21),AY(6,20),BY(6,20),CCY(6,20),DY(6,
       120)
        COMMON/SHPLE/ NLE,YSL(15),AQL(14),BQL(14),CQL(14),DQL(14)
        COMMON/SHPTE/ NTE,YST(15),AQT(14),BQT(14),CQT(14),DQT(14)
        COMMON /SSS/ NASYM,NSUR,LPANEL,ICAMB,NUMS,IAGVX,NAUG,IBD,IDIH
       2,IRL,KT,NC1,NC2,IBLC,PT,PBK,PIS,ALPINC,PI,ALQ,ALZ
        COMMON/LCOP/KWW,NALP,KALP,TANC2,CLDS,AL,CLII,ALPII,ALPA(15)
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```
      COMMON/GD/ TINP(6),BREAK(6,10),TFLP(6,5),RINC(6),YBREAK(6,7)
     1,DCOS(6,5),DSIN(6,5),IWING(6),IWGLT(6),IV(6),LPAN1(6)
     1,ICAMT(6),NAL(6)
      COMMON/GDSL/ DF(6,5),YCN(6,4),SNALP(50),CNALP(50)
     1,ALPH(50),AUX(6,5),CRX(6,5),XTILT(6),SLETH(6),YCNTD(6)
     1,XCNTD(6),CTILT(6),SWPP(6,5),RC(6,50),XREF
     1,BUX(6,5),SE(3,6,15),CVR(50),CPAUG(IDM)
     1,ALPBD(6,2),ALBDBR(6,2),ALBDBL(6,2),MVRTX(6)
     1,NLEF(6),NVRTX(6),NVL1(6),NVL2(6),NUR(6),MX(6)
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),
     1DDF(20)
      COMMON /FUS/ XF(IDFL),XCF(IDFL),RF(IDFL),SNP(5,IDFL),XLEF,XTEF,
     1WARD(IDFL),CSF(5,IDFC),XAS(6),F0,F10,WKN,RDX,X1,NCUM,NF,NT
     1,NKF(5),KF,NTL,LWF
      COMMON/BCAM/ IBCM,NBCM,XBCM(21),ZBCM(21),ABC(20),BBC(20),CBC(20)
     1 ,DBC(20)
      COMMON/SRCT/ISYM,JSCT,TSF(21,21),RSF(21,21)
      COMMON/CONSP/JSYM,NTHETA,KK3
      COMMON/FAC/FB
      COMMON /INOUT/ INPT,JPT
      COMMON/AIRFL/ REALP(50),RALP(50),SALP(4,8,20),SLA(4,8,20)
     1,SLB(4,8,20),ALP0(4,8),YIB(4,8),YOB(4,8),ALMAX(4,8)
     2,ALMIN(4,8),DAPZ(4,50),PARMF,NLDMM,NLDM(4),JK,IT,NAR(4)
      COMMON/AIRFD/ NCLCD(4)
      COMMON/AIRPM/ XMRF(4,8)
      COMMON/ITERR/NITER,MITER,IWAKE
C     COMMON/NAUGW/LPP,NSTAR,NSECT
      COMMON/NAUGW/JITER,KITER,LPP,NSTAR,NSECT
      COMMON/WIL1/KKI(6),DL1(6)
      COMMON/RFILE/NOLD2,NOLD,NOLD1
      COMMON/DIHEN/ YYG(50),ZZG(50)
      COMMON/DIHEL/ XLG(50),YLG(50),ZLG(50)
      COMMON/LOCAT/XY1,YZ1,NMAX,NMAX1
      COMMON /LELOC/ XLC(50),XTC(50),PSI1(50),YLE1(50),ZLE1(50)
      COMMON /LEDSUF/ BSQD4P,NSUF,LEV,JB,ITER,XEND(IPL)
      COMMON /ALLRA/ BETA1,BETA2,TANPH1,B2PH1,D4,D4SQ2
      COMMON /NSTRIP/ NSP(6),NCP(6)
      COMMON /XSTN/ XBRR(6,25),NBRR(6)
      COMMON /NBC/ TTL(6),CONS(100),CH1(50),SNN(6,15,2)
      COMMON /ITRAK/ ITRAKE(IPL),NAERO,ISPAN,ITERS,NCONTS,MITE,IPUNCH
      COMMON /NCTT/ NCT,NCON,NBT,NCOR(IPL,15),KU1,NFSH(IPL,15),KUC
      COMMON /AREA1/ AREA(6)
      COMMON /MIDCP/ NPC, ICP, NPC1, MSTW
      COMMON /RELAX1/ IRELX, TSS, TSP
      COMMON /RELDIF/ DIF1, DIF2 ,DIF3, DIF4, IRELF
      COMMON /NFIL/ JTT
      COMMON /ISTART/ ISTAR, IRDC
      COMMON /DEBUG/ NDBU,IDBU
      COMMON /LATLE/ LITE, LCA, NQ1, NQ2, LATT, IREA, MQ1
      COMMON /LEFTE/ YYG1(50)
      COMMON /IPN1/ IBREAK(6,10)
      COMMON /VERPAN/ JEER, IPOL, FAC10
      COMMON /SCRATC/ NF11,NF12,NF13,NF14,NF15,NF16,NF18,NF19,NF25,NF26
      COMMON /COUNTE/ ILFOR, ILAFT, ILMAX, ISY
      COMMON/XINPUTR/XALPHA,XBETA,BSEP,ABEGIN1,ABEGIN
     &,FORBLN,COEFF1,COEFF2,COEFF3
     &,CREFFU,RNFU,XLEFFU,XORING(6)
      COMMON/XINPUTI/IPRINT,IXCASE,ILMAX1,isharp,NMAXX,NCIRCLE
      COMMON/XGEOM/ BLLP,AYY1,BZU1,BZL1,AB10,AYS1,BZS,CSEP,THSEP(50,2)
     &              ,NKK,MKK
      common /fusrl/ iby,ifb,xfd(21),rfd(21)
      COMMON/CHINE/THETAU(50),THETAL(50)
      COMMON/GEOMMAP/MO2,N20,N120,ITMAX
      COMMON/GEOMMAPR/P20,RESTAR,XCI(30),YCI(30)
      COMMON /MULTGR/ MULTIG, KITR
      COMMON /VOTXBD/ RTK1(6,2),RTBR(6,2),RTBL(6,2),DXAR(6,2),DXAL(6,2),
     &              DXA1(6,2), MST(6), IVBS(6), IVBR(6), IVBL(6)
      COMMON /VERTX/ IVERTX(6)
      COMMON/CPCR/ CYPZ,CLPZ,CNPZ,LATITR
      COMMON /FORBOD/ IFORB
      common /plt/pxxl(10,2),pxxt(10,2),pyl(10,2),pzs(10),pdihed(10)
      common/ktw/kount
      common /plot/iplot,IPLE,IPWAK,IPTIP,ipwings,ipfslg,iforbody
      DATA SURA,CBAR/20*0./
      DATA XL1,YL1/880*0./
      DATA XXL,YL,XXT,CPCWL,CPSWL,AW,CA/153*0./
      DATA FUSX,FUSY/42*0./
      DATA FUS1,FUS2/42*0./
    2 FORMAT (8F10.6)
  141 FORMAT('****SURFACE # ',I2,'****')
```

```
    3 FORMAT (8(6X,I4))
    4 FORMAT (/5X,8HHALF SW=,E12.5,10X,5HCREF=,E12.5)
    6 FORMAT (1X,13HCASE NUMBER =,I2)
    7 FORMAT (6F10.5)
    8 FORMAT (1X,40H****************************************)
  400 FORMAT(1X,10HINPUT DATA)
  403 FORMAT(1X,36HVORTEX ELEMENT ENDPOINT COORDINATES=)
  404 FORMAT(1X,26HCONTROL POINT COORDINATES=)
  411 FORMAT(/4X,3HXCP,7X,3HYCP,7X,3HZCP,7X,3HXCP,7X,3HYCP,7X,3HZCP)
  412 FORMAT(/4X,2HX1,8X,2HX2,8X,2HY1,8X,2HY2,8X,2HZ1,6X,2HZ2)
  530 FORMAT(20A4)
      IF(LATITR.EQ.2) GO TO 142
      inpt=5
      jpt=16
      IDBU=29
      PI=3.14159265
      RAD=PI/180.
      kount =0
      KPP=0
      ISY=0
      LMTT=IDM-1
      PIS=PI*2.
      PIA=PI/2.
      CNET=PI/180.
C
      READ(INPT,530) AAA
      READ (INPT,*) NCASE,NGRD,NSUR
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NCASE,NGRD,NSUR
      WRITE (JPT,8)
      WRITE (JPT,6) NCASE
      WRITE (JPT,8)
C
      NASYM=0
      WRITE (JPT,400)
      READ(INPT,530) AAA
      READ (INPT,*) LAT,IBLC,KT,IBD,NLDMM
      WRITE(JPT,530) AAA
      WRITE(JPT,3) LAT,IBLC,KT,IBD,NLDMM
      IF(NLDMM.GT.1) NLDMM=1
      DO 1122 K=1,NSUR
      NSS=0
C
      READ(INPT,530) AAA
      READ (INPT,*)NC(K),(M1(K,I),I=1,NC(K)),NWING(K),IWGLT(K),
     1IPOS(K)
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NC(K),(M1(K,I),I=1,NC(K)),NWING(K),IWGLT(K),
     1IPOS(K)
C
      IF(NWING(K).EQ.0) NWING(K)=1
      IF(IWGLT(K).EQ.0.AND.NWING(K).NE.NC(K)) NWING(K)=NC(K)
      DO 1123 KP=1,NC(K)
 1123 M1(K,KP)=M1(K,KP)+1
      READ(INPT,530) AAA
      READ (INPT,*)NFP(K),(NJW(K,I),I=1,NFP(K)),NVRTX(K),MVRTX(K),NLEF(K
     1),IV(K),NAL(K)
      WRITE(JPT,530) AAA
      WRITE (JPT,3)NFP(K),(NJW(K,I),I=1,NFP(K)),NVRTX(K),MVRTX(K),NLEF(K
     1),IV(K),NAL(K)
      READ(INPT,530) AAA
      READ (INPT,*) (DF(K,I),I=1,NFP(K))
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (DF(K,I),I=1,NFP(K))
C
      READ(INPT,530) AAA
      READ (INPT,*) (NW(K,I),I=1,2),ICAM(K),IST(K),ICAMT(K),ITHCK(K)
     &,NST(K),NDIT
      WRITE(JPT,530) AAA
      WRITE(JPT,3) (NW(K,I),I=1,2),ICAM(K),IST(K),ICAMT(K),ITHCK(K)
     &,NST(K),NDIT
C
      IF(ICAM(K).NE.1) GO TO 191
      DO 192 I=1,IST(K)
      JJ=I
      READ(INPT,530) AAA
      READ (INPT,*) YT(K,I),XNUM,CURV(K,I),CHND(K,I)
      im(k,i) = xnum
      WRITE(JPT,530) AAA
c      type*, '8',I
```

```
          WRITE(JPT,2) YT(K,I),XNUM,CURV(K,I),CHND(K,I)
          IR=IM(K,I)
          ICV=CURV(K,I)
          READ(INPT,530) AAA
          READ (INPT,*) (XT(K,I,J),J=1,IR)
c          type*, '9',I
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (XT(K,I,J),J=1,IR)
          READ(INPT,530) AAA
          READ (INPT,*) (CA(J),J=1,IR)
c          type*, '10',I
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (CA(J),J=1,IR)
    192 CONTINUE
    191 CONTINUE
          IF(ICAM(K).NE.3) GO TO 2005
          DO 2006 I=1,IST(K)
          READ(INPT,530) AAA
          READ (INPT,*) (YLEF(K,I,KQ),KQ=1,2)
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (YLEF(K,I,KQ),KQ=1,2)
          READ(INPT,530) AAA
          READ (INPT,*) XLF(K,I,1),YLF(K,I,1),Z1,XLF(K,I,2),YLF(K,I,2),Z2
          WRITE(JPT,530) AAA
          WRITE(JPT,2) XLF(K,I,1),YLF(K,I,1),Z1,XLF(K,I,2),YLF(K,I,2),Z2
          READ(INPT,530) AAA
          READ (INPT,*) XLF(K,I,3),YLF(K,I,3),Z3,XLF(K,I,4),YLF(K,I,4),Z4
          WRITE(JPT,530) AAA
          WRITE(JPT,2) XLF(K,I,3),YLF(K,I,3),Z3,XLF(K,I,4),YLF(K,I,4),Z4
   2006 CONTINUE
   2005 CONTINUE
C          CHANGES 12/21/87
          IF(ITHCK(K).EQ.0) GO TO 200
C
          DO 201 I=1,NST(K)
          READ(INPT,530) AAA
          READ(INPT,*) YH(K,I),XNUM,CRVT,CHTD(K,I)
          WRITE(JPT,530) AAA
          WRITE(JPT,2) YH(K,I),XNUM,CRVT,CHTD(K,I)
          IP=LTH(K,I)
          ICV=CRVT
          READ(INPT,530) AAA
          READ(INPT,*) (XH(K,I,J),J=1,IP)
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (XH(K,I,J),J=1,IP)
          READ(INPT,530) AAA
          READ(INPT,*) (CA(J),J=1,IP)
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (CA(J),J=1,IP)
C
    201 CONTINUE
    200 CONTINUE
C
          IF(ICAM(K).EQ.0) IST(K)=1
          NKW=NW(K,1)
          L=1
          DO 10 KK=1,NC(K)
C
          READ(INPT,530) AAA
          READ (INPT,*) IPN
          WRITE(JPT,530) AAA
          WRITE(JPT,3) IPN
C
          READ(INPT,530) AAA
          READ (INPT,*) (XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED
          WRITE(JPT,530) AAA
          WRITE(JPT,2) (XXL(I),XXT(I),YL(I),I=1,2),ZS,DIHED
          kount = kount +1
          pxxl(kount,1)=xxl(1)
          pxxl(kount,2)=xxl(2)
          pxxt(kount,1)=xxt(1)
          pxxt(kount,2)=xxt(2)
          pyl(kount,1)=yl(1)
          pyl(kount,2)=yl(2)
          pzs(kount)=zs
          pdihed(kount)=dihed
          IF(IPN.EQ.0) GO TO 2320
C
          READ(INPT,530) AAA
          READ (INPT,*) NLE,NTE,MCVL,MCVT
```

```
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NLE,NTE,MCVL,MCVT
C
      READ(INPT,530) AAA
      READ (INPT,*) (CA(I),I=1,NLE)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (CA(I),I=1,NLE)
      READ(INPT,530) AAA
      READ (INPT,*) (YSL(I),I=1,NLE)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (YSL(I),I=1,NLE)
      READ(INPT,530) AAA
      READ (INPT,*) (CA(I),I=1,NTE)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (CA(I),I=1,NTE)
      READ(INPT,530) AAA
      READ (INPT,*) (YST(I),I=1,NTE)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (YST(I),I=1,NTE)
 2320 continue
      NSW=M1(K,KK)
      NSS=NSW-1
 10   CONTINUE
      IF (L .EQ. 2) GO TO 107
      NSS=NSS*2
  107 CONTINUE
      IF(K.EQ.1) NS(K)=NSS/2
      IF(K.GT.1) NS(K)=NS(K-1)+NSS/2
C       WRITE(JPT,3) NS(K),LPN(K),LPAN1(K),LPANEL
      IF(KT.EQ.0) GO TO 1119
      READ(INPT,530) AAA
      READ (INPT,*) ICNLE(K)
      WRITE(JPT,530) AAA
      WRITE(JPT,3) ICNLE(K)
      NMR=1
      IF (ICNLE(K).EQ.2) NMR=NS(K)
C
      READ(INPT,530) AAA
      READ (INPT,*) (RC(K,I),I=1,NMR)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (RC(K,I),I=1,NMR)
C
 1119 CONTINUE
C
      READ(INPT,530) AAA
      READ (INPT,*) TWST,RINC(K),TINP(K)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) TWST,RINC(K),TINP(K)
      ITWST(K)=TWST
      IF (ITWST(K).EQ.0) GO TO 1101
C
      READ(INPT,530) AAA
      READ (INPT,*) YNUM,TCURV
      WRITE(JPT,530) AAA
      WRITE(JPT,2) YNUM,TCURV
      NYM(K)=YNUM
      NTCV=TCURV
C
      READ(INPT,530) AAA
      READ (INPT,*) (YTS(K,I),I=1,NYM(K))
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (YTS(K,I),I=1,NYM(K))
      READ(INPT,530) AAA
      READ (INPT,*) (CA(I),I=1,NYM(K))
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (CA(I),I=1,NYM(K))
 1101 CONTINUE
      IF(NLDMM.EQ.0) GO TO 1122
C
      READ(INPT,530) AAA
      READ(INPT,*) INMM,NARM
      WRITE(JPT,530) AAA
      WRITE(JPT,3) INMM,NARM
      NLDM(K)=INMM
      NAR(K)=NARM
      IN1=INMM-1
      IF(NLDM(K).EQ.0) GO TO 1122
      DO 1100 KY=1,NARM
      READ(INPT,530) AAA
      READ(INPT,*) ALP0(K,KY),YIB(K,KY),YOB(K,KY),CLCD,PARMF
```

```
           WRITE(JPT,530) AAA
           WRITE(JPT,2) ALP0(K,KY),YIB(K,KY),YOB(K,KY),CLCD,PARMF
     C
           IREAD=INPT
           IF(NLDMFL.EQ.1) IREAD=17
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  (AW(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (AW(I),I=1,INMM)
           READ(INPT,530) AAA
           READ(IREAD *,END=211)  (CA(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (CA(I),I=1,INMM)
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  (AW(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (AW(I),I=1,INMM)
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  (CA(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (CA(I),I=1,INMM)
     C
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  XMRF(K,KY)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  XMRF(K,KY)
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  (AW(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (AW(I),I=1,INMM)
           READ(INPT,530) AAA
           READ(IREAD,*,END=211)  (CA(I),I=1,INMM)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  (CA(I),I=1,INMM)
      1100 CONTINUE
      1122 CONTINUE
     C
           READ(INPT,530) AAA
           READ  (INPT,*)  AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
     C
     C
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
     C
           READ(INPT,530) AAA
           READ(INPT,*)  ALNM,SNUM,DVRTX,CLDS
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  ALNM,SNUM,DVRTX,CLDS
     C
           KALP=ALPCON
           IF(KALP.GE.2) ALPCON=0.
           INUM=SNUM
           IF(INUM.EQ.0)  INUM=1
           NALP=ALNM
           IF(NALP.EQ.0)  NALP=1
     C
           ALPA(1)=0.
     C      IF(KALP.EQ.1) GO TO 2110
           READ(INPT,530) AAA
           READ(INPT,*)(ALPA(I),I=1,NALP)
           WRITE(JPT,530) AAA
           WRITE(JPT,2)(ALPA(I),I=1,NALP)
      2110 CONTINUE
           IF(KALP.GE.2) NALP=10
           DO 2090 I=1,INUM
           READ(INPT,530) AAA
           READ(INPT,*)  SNI,SNE,CTILT(I),SLETH(I),XCNTD(I),YCNTD(I),XTILT(I),
          1SR
           WRITE(JPT,530) AAA
           WRITE(JPT,2)  SNI,SNE,CTILT(I),SLETH(I),XCNTD(I),YCNTD(I),XTILT(I),
          1SR
      2090 XCNTD(I)=XCNTD(I)-XREF
     C
           READ(INPT,530) AAA
           READ  (INPT,*)  HEIGHT,ATT
           WRITE(JPT,530) AAA
           WRITE  (JPT,2)  HEIGHT,ATT
           IF(LAT .NE. 1)  GO TO 1002
     C...
           READ(INPT,530) AAA
```

```
      READ (INPT,*) P,BK,RL
      WRITE(JPT,530) AAA
      WRITE(JPT,2) P,BK,RL
 1002 CONTINUE
C
      READ(INPT,530) AAA
      READ(INPT,*) KF,NT,NCUM,NF,IBY,IBCM
      WRITE(JPT,530) AAA
      WRITE(JPT,3) KF,NT,NCUM,NF,IBY,IBCM
      KW=1
      IF (KF .EQ. 0) GO TO 1049
      KW1=KW+1
C
      READ(INPT,530) AAA
      READ(INPT,*) (XAS(I),I=1,KW1),FUSIND,FUSNO,FSHAP,X1,X2,X3
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (XAS(I),I=1,KW1),FUSIND,FUSNO,FSHAP,X1,X2,X3
      iforb=0
      if (x3. gt. 0.) iforb = 1
      IFR=FUSIND
      IFN=FUSNO
      IFSP=FSHAP
      READ(INPT,530) AAA
      READ(INPT,*) ISYM,JSCT
      WRITE(JPT,530) AAA
      WRITE(JPT,*) ISYM,JSCT
      JSYM=ISYM
      IF (IFR .EQ. 0) GO TO 26
      READ(INPT,530) AAA
      READ(INPT,*) (XFF(I),I=1,IFN)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (XFF(I),I=1,IFN)
      IF(ISYM.EQ.0) GO TO 27
      READ(INPT,530) AAA
      READ(INPT,*) (RFF(I),I=1,IFN)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (RFF(I),I=1,IFN)
C
   27 IF(IBY.EQ.0) GO TO 44
      READ(INPT,530) AAA
      READ(INPT,*) (XFD(I),I=1,IFN)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (XFD(I),I=1,IFN)
      READ(INPT,530) AAA
      READ(INPT,*) (RFD(I),I=1,IFN)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (RFD(I),I=1,IFN)
   44 IF(ISYM.EQ.1) GO TO 26
      DO 45 I=1,IFN
      READ(INPT,530) AAA
      READ(INPT,*) (TSF(I,J),J=1,JSCT)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (TSF(I,J),J=1,JSCT)
      READ(INPT,530) AAA
      READ(INPT,*) (RSF(I,J),J=1,JSCT)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (RSF(I,J),J=1,JSCT)
   45 CONTINUE
   26 CONTINUE
      IF(KF.EQ.0) GO TO 1040
      IF(IBCM.EQ.0) GO TO 33
      READ(INPT,530) AAA
      READ(INPT,*) NBCM
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NBCM
      READ(INPT,530) AAA
      READ(INPT,*) (XBCM(I),I=1,NBCM)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (XBCM(I),I=1,NBCM)
      READ(INPT,530) AAA
      READ(INPT,*) (ZBCM(I),I=1,NBCM)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (ZBCM(I),I=1,NBCM)
 33   CONTINUE
      IFB=IFN
 1049 continue
 1040 CONTINUE
      IF (KF .NE. 0) THEN
      READ(INPT,530) AAA
      READ (INPT,*) IFORB1
```

```
          WRITE(JPT,530) AAA
          WRITE (JPT,3) IFORB1
          IF (IFORB1 .EQ. 0) IFORB=0
          if (iforb.eq.1) then
          xbeta=bk*180./pi
          if (ibd.eq.1) then
          else
          end if
C
          READ(INPT,530) AAA
          READ(INPT,*) IPRINT,IXCASE,ISY,isharp,NCIRCLE
          WRITE(JPT,530) AAA
          WRITE(JPT,3)IPRINT,IXCASE,ISY,isharp,NCIRCLE
          READ(INPT,530) AAA
          READ(INPT,*) BSEP,COEFF1,COEFF2,COEFF3,CSEP
          WRITE(JPT,530) AAA
           WRITE(JPT,2)BSEP,COEFF1,COEFF2,COEFF3,CSEP
           FORBLN=X3
           ICSEP=CSEP
           neva = 6
           if (isharp.eq.1) neva=8
          READ(INPT,530) AAA
           READ(INPT,*)(XORING(I),I=1,neva)
          WRITE(JPT,530) AAA
           WRITE(JPT,2) (XORING(I),I=1,neva)
C           IF(CSEP.EQ.1)READ  (INPT,*)(THSEP(IREK),IREK=1,IFN)
           IF(ICSEP.EQ.1) THEN
          READ(INPT,530) AAA
           READ(INPT,*) IFFN
          WRITE(JPT,530) AAA
           WRITE(JPT,3) IFFN
          READ(INPT,530) AAA
           READ(INPT,*)  (THSEP(IREK,1),IREK=1,IFFN)
          WRITE(JPT,530) AAA
           WRITE(JPT,2)  (THSEP(IREK,1),IREK=1,IFFN)
          READ(INPT,530) AAA
           READ(INPT,*)  (THSEP(IREK,2),IREK=1,IFFN)
          WRITE(JPT,530) AAA
           WRITE(JPT,2)  (THSEP(IREK,2),IREK=1,IFFN)
           END IF
           IF(ISY.EQ.0)NMAXX=1
           IF(ISY.EQ.1)NMAXX=2
C
           IF(IXCASE.LT.2)THEN
            ELLP=0.0
           ELSE
            ELLP=1.0
           END IF
           IF (ELLP .EQ. 1) THEN
          READ(INPT,530) AAA
            READ(INPT,*)MO2,N20,ITMAX
          WRITE(JPT,530) AAA
            WRITE(JPT,3)MO2,N20,ITMAX
          READ(INPT,530) AAA
            READ(INPT,*)P20
          WRITE(JPT,530) AAA
            WRITE(JPT,2) P20
           END IF
           IF(IXCASE.EQ.2)THEN
          READ(INPT,530) AAA
            READ(INPT,*) IFFN
          WRITE(JPT,530) AAA
            WRITE(JPT,3) IFFN
          READ(INPT,530) AAA
            READ(INPT,*)(THETAU(IREK),IREK=1,IFFN)
          WRITE(JPT,530) AAA
            WRITE(JPT,2)(THETAU(IREK),IREK=1,IFFN)
          READ(INPT,530) AAA
            READ(INPT,*)(THETAL(IREK),IREK=1,IFFN)
          WRITE(JPT,530) AAA
            WRITE(JPT,2)(THETAL(IREK),IREK=1,IFFN)
           END IF
          END IF
          END IF
          IPOL=0
          FAC10=1.
          IF(X3.LE.0.0) IFORB=0
          READ(INPT,530) AAA
          READ(INPT,*) IWAKE
          WRITE(JPT,530) AAA
```

```
      WRITE(JPT,3) IWAKE
      NITER=0
      MITER=0
      IF(IWAKE.EQ.0) GO TO 776
      READ(INPT,530) AAA
      READ(INPT,*) NOLD2,NOLD,NOLD1
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NOLD2,NOLD,NOLD1
      READ(INPT,530) AAA
C      READ (INPT,*) NITER,MITER,JITER,KITER
      READ(INPT,*) NITER,JITER
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NITER,JITER
      MITER=NITER
      KITER=JITER
      IF(NOLD2.EQ.0) GO TO 785
      READ(INPT,530) AAA
      READ(INPT,*) (KKI(K),K=1,NSUR)
      WRITE(JPT,530) AAA
      WRITE(JPT,3) (KKI(K),K=1,NSUR)
  785 CONTINUE
      LPP=0
      NSTAR=0
      NSECT=0
  773 CONTINUE
      IF(JITER.EQ.0) GO TO 771
      READ(INPT,530) AAA
      READ(INPT,*) LPP,NSTAR,NSECT
      WRITE(JPT,530) AAA
      WRITE(JPT,3) LPP,NSTAR,NSECT
      READ(INPT,530) AAA
      READ (INPT,*) (XDV(I),I=1,LPP)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (XDV(I),I=1,LPP)
      READ(INPT,530) AAA
      READ (INPT,*) (YDV(I),I=1,LPP)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (YDV(I),I=1,LPP)
      READ(INPT,530) AAA
      READ (INPT,*) (ZDV(I),I=1,LPP)
      WRITE(JPT,530) AAA
      WRITE(JPT,2) (ZDV(I),I=1,LPP)
  771 CONTINUE
      READ(INPT,530) AAA
      READ(INPT,*) NMAX1
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NMAX1
      IF(NMAX1.EQ.0) GO TO 774
      READ(INPT,530) AAA
      READ(INPT,*) XY1,YZ1
C     READ(INPT,*) NMAX
      WRITE(JPT,530) AAA
      WRITE(JPT,2) XY1,YZ1
C     WRITE(JPT,3) NMAX
      NMAX=0
  774 CONTINUE
  776 CONTINUE
      LCA=0
      NSUF=NSUR
      READ(INPT,530) AAA
      READ(INPT,*) LEV
      WRITE(JPT,530) AAA
      WRITE(JPT,3) LEV
      IF(LEV.EQ.0) GO TO 140
      READ(INPT,530) AAA
      READ(INPT,*) NSUF,NPC,ICP,MSTW,MITE
      WRITE(JPT,530) AAA
      WRITE(JPT,3) NSUF,NPC,ICP,MSTW,MITE
      ITER=0
      NPC1=0
      NCONTS=0
      ISPAN=0
      ITERS=0
      IPUNCH=0
      IRELX=0
      KU1=40
C...
      DO 139 IL=1,NSUF
      READ(INPT,530) AAA
      READ (INPT,*) ITIPV(IL),MST(IL)
```

```
        WRITE(JPT,530) AAA
        WRITE (JPT,3) ITIPV(IL),MST(IL)
        ITRAKE(IL)=1
        IF (MST(IL) .EQ. 0) THEN
           IF (IL .EQ. 1) THEN
              MST(IL)=NS(IL)
           ELSE
              MST(IL)=NS(IL)-NS(IL-1)
           END IF
        END IF
C...
        READ(INPT,530) AAA
        READ (INPT,*) MULTIG,KITR
        WRITE(JPT,530) AAA
        WRITE (JPT,3) MULTIG,KITR
        READ(INPT,530) AAA
        READ(INPT,*) DELTA(IL),DELT(IL),YEND(IL)
        WRITE(JPT,530) AAA
        WRITE(JPT,2) DELTA(IL),DELT(IL),YEND(IL)
        READ(INPT,530) AAA
        READ (INPT,*) NBRR(IL)
        WRITE(JPT,530) AAA
        WRITE (JPT,3) NBRR(IL)
        IF(NBRR(IL) .NE. 0) THEN
        READ(INPT,530) AAA
        READ (INPT,*) (XBRR(IL,ITT),ITT=1,NBRR(IL))
        WRITE(JPT,530) AAA
        WRITE (JPT,2) (XBRR(IL,ITT),ITT=1,NBRR(IL))
        END IF
        AREA(IL)=2.*HALFSW
C. .
  139   CONTINUE
C...    TEMP. CHANGES SEPT/23/88
C       READ (INPT,*) DIF1,DIF2,DIF3,DIF4
C       WRITE (JPT,2) DIF1,DIF2,DIF3,DIF4
C...
        READ(INPT,530) AAA
        READ (INPT,*) DIF1,DIF2
        WRITE(JPT,530) AAA
        WRITE (JPT,2) DIF1,DIF2
        IRDC=0
        IRELF=0
        IF(NSUR.EQ.1) IRELF=1
        IF(LAT.EQ.1) THEN
        READ(INPT,530) AAA
        READ (INPT,*) NQ1,IREA,ISTAR
        WRITE(JPT,530) AAA
        WRITE (JPT,3) NQ1,IREA,ISTAR
        END IF
        lite=mite
  140   CONTINUE
  142   continue
C         READ (INPT,*) NDBU
C        WRITE (JPT,3) NDBU
  919   FORMAT(/5X,'SKIN FRICTION COEFFICIENT =',F10.5)
  920   FORMAT(/5X,'TOTAL WEITED SURFACE AREA =',F10.5)
c 211   WRITE(JPT,212)
  211   continue
  212   FORMAT(/2X,'*** END OF FILE CONTAINING AIRFOIL SECTION DATA HAS BE
       1EN REACHED ***')
   30   FORMAT(//5X,'TOP VIEW OF INPUT CONFIGURATION')
   36   FORMAT(//5X,'SKETCH OF VORTEX STRIPS')
        RETURN
        END
C

C
        SUBROUTINE nnvortex
c          IMPLICIT REAL*8 (A-H,O-Z)
        PARAMETER (IPL=2,IPS=80,IPD=15,IPC=50)
        PARAMETER (IP2=(6*50*20-IPL*IPS*IPD)*3)
        PARAMETER (IP3=(6*50*23-IPL*IPC*IPD-IPL*IPC*18)*3)
        DIMENSION XE(IPL,IPS,ipd),YE(IPL,IPS,ipd),ZE(IPL,IPS,ipd)
        DIMENSION XXE(IPL,IPC,ipd),YYE(IPL,IPC,ipd),ZZE(IPL,IPC,ipd)
        DIMENSION XTIP(IPL,IPC,ipd),YTIP(IPL,IPC,ipd),ZTIP(IPL,IPC,ipd)
        dimension x(60),y(60),z(60),xx(60),yy(60),zz(60)
        dimension xxx(60),yyy(60),zzz(60)
        dimension text (20)
        COMMON /LOC/ FU1,FU2,YEND,PXL(6,9,2),PXT(6,9,2),PYL(6,9,2),
       &                 PXT1(6,9,20)
```

```
      COMMON /TIPVX/ NTLM(IPL,18),NTMAX(IPL)
      COMMON /ITRAK/ ITRAKE(IPL),NAERO,ISPAN,ITERS,NCONTS,MITE,IPUNCH
      COMMON /NCTT/ NCT,NCON,NBT,NCOR(IPL,15),KU1,NFSH(IPL,15),KUC
      COMMON /ALLRA/ BETA1,BETA2,TANPH1,B2PH1,D4,D4SQ2
      COMMON /NSTRIP/ NSSW(6),NSST(6)
      COMMON /ALLRB1/ NELM(IPL,IPD),NNELM(IPL,IPD),ZMIN(IPL,IPD)
      COMMON /NBC/ TTL(6),CONS(100),CH1(50),SNN(6,15,2)
      COMMON /NFIL/ JT
      COMMON /INOUT/  INPT,JPT
      COMMON /SCRATC/ NF11,NF12,NF13,NF14,NF15,NF16,NF18,NF19,NF25,NF26
      COMMON /FORBOD/ IFORB
c      DIMENSION NW(6,*)
      common /plot/iplot,IPLE,IPWAK,IPTIP,ipwings,ipfslg,iforbody
      common /stp/ istop
      COMMON /LEDSUF/ BSQD4P,NSUF,LEV,JB,ITER,XEND(IPL)
      COMMON /LATLE/ LITE, LCA, NQ1, NQ2, LATT, IREA, MQ1
      REWIND JT
      idk=26
      istop=0
      if(iplot.eq.1) idk=28
      iside = 0
 11   read (idk,111,end=80) text
      write (jpt,111) text
      PI=3.14159265
      KU3 =  KU1-3
      ALP=ALPHA*180./PI
      AMACH=SQRT(1.-BETA2)
C     WRITE FREE ELEMENTS LOCATIONS
      read(idk,140) ALP,AMACH,ITER
      write(jpt,140) alp,amach,iter
C     IF (ITER.GE.KU3) WRITE (NF26,140) TTL,ALP,AMACH,ITER
c***********************************

c     4/ 18/ 89

      if ( nql .eq. 1) then
      read (idk, 910 ) p
      else if ( nql . eq. 2) then
      read (idk, 920) bk2
      else if ( nql .eq. 3) then
      read (idk, 930) rl
      else if ( nql .eq. 12) then
      read (idk, 940)
      end if
c******************************


      DO 1 KK = 1, NSUF
      read (idk,141) kKK,MAXL
      write (jpt,141)kkk,maxl
       call jlstyl (0)
       call jlwide (16383)
       DO 30 I=1,MAXL
c***       if (i .ne. 1 .or. i .ne. 8 ) call jcolor (i)
      read (idk,180)kKK,iI,K
      write (jpt,180)kkk,ii,k
      read (idk,170)  (XE(KK,J,I),J=1,K)
      read (idk,170)  (YE(KK,J,I),J=1,K)
      read (idk,170)  (ZE(KK,J,I),J=1,K)
      if (i.eq.1) go to 30
      if (iple.eq.0) go to 30

      do 301 kpt=1,k
      if (kpt.le.3) go to 301
      kkpt=kpt-3
      x(kkpt)=xe(kk,kpt,i)
      y(kkpt)=ye(kk,kpt,i)
      z(kkpt)=ze(kk,kpt,i)
      if (kpt.eq.4) call j3move (x(1),y(1),z(1))
      if (x(kkpt).eq.0. .and. y(kkpt).eq.0. .and.
     1z(kkpt).eq.0. ) go to 303
      call j3draw (x(kkpt),y(kkpt),z(kkpt))
 301  continue
 303  continue
  30  continue
      call jlstyl (1)
      read (idk,210) kKK,MAXW
      write (jpt,210) kkk,maxw
      DO 40 I=1,MAXW
c***       if (i .ne. 1 .or. i .ne. 8 ) call jcolor (i)
```

```
        read (idk,180)kKK,iI,K1
        write (jpt,180) kkk,ii,k1
        read (idk,170) (XXE(KK,J,I),J=1,K1)
        read (idk,170) (YYE(KK,J,I),J=1,K1)
        read (idk,170) (ZZE(KK,J,I),J=1,K1)
        if (ipwak.eq.0) go to 40

        do 401 kpt=1,k1
        xx(kpt) = xxe(kk,kpt,i)
        yy(kpt) = yye(kk,kpt,i)
        zz(kpt) = zze(kk,kpt,i)
        if (kpt.eq.1) call j3move (xx(1),yy(1),zz(1))
        call j3draw (xx(kpt),yy(kpt),zz(kpt))
  401   continue
   40   continue
        IF (TTL(KK) .EQ. 0) GO TO 60
        call jlstyl(2)
        call jlwide (16383)
        read (idk,142) kKK,NCW
        DO 50 I=1,NCW
        read (idk,180) kKK,iI,K2
        read (idk,170) (XTIP(KK,J,I),J=1,K2)
        read (idk,170) (YTIP(KK,J,I),J=1,K2)
        read (idk,170) (ZTIP(KK,J,I),J=1,K2)
        if (itip.eq.0) go to 50

        do 501 kpt=1,k2
        xxx(kpt) = xtip (kk,kpt,i)
        yyy(kpt) = ytip (kk,kpt,i)
        zzz(kpt) = ztip (kk,kpt,i)
        if (kpt.eq.1) call j3move (xxx(1),yyy(1),zzz(1))
        call j3draw (xxx(kpt),yyy(kpt),zzz(kpt))
  501   continue
  50    CONTINUE
  60    CONTINUE
    1   CONTINUE
        iside = iside +1
        if (iside .le. 1) go to 11
        return
 111    format (20a4)
 140    FORMAT (1H1,//,1X,12HALPHA(DEG.)=,F6.3,14H  MACH NUMBER=,F6
       1 3,19H  ITERATION NUMBER=,I2)
  141   FORMAT (1H1,//,1X,21HLEADING EDGE ELEMENTS,5X,10HSURFACE # ,I2,5X,
       2'STRIP # ',I2,/1X,21H*********************,5X,11H***********,5X,'*
       &********')
 170    FORMAT (1H ,14F9.4)
 180    FORMAT (1H ,6H **** ,I2,5H      ,I2,5X,I2,6H  ****)
 210    FORMAT (1H1,//,14H WAKE ELEMENTS,5X,10HSURFACE # ,I2,5X,'STRIP # '
       1,I2/,14H *************,5X,11H***********,5X,'*********')
 142    FORMAT (1H1,//,13H TIP ELEMENTS,5X,10HSURFACE # ,I2,5X,'STRIP # ',
       1I2 /,14H *************,5X,11H***********,5X,'*********')
  80    istop=1

c****************************************

  910   format ( 5x, 'roll rate = ', f10.3)
  920   format ( 5x, 'sideslip angle =', f10.3, 1x,'degrees')
  930   format ( 5x, 'yaw rate =' , f10.3)
  940   format ( 5x, 'with control surface deflection' )

c*****************************************

        RETURN
        END
C...


C...
C...
        SUBROUTINE FORINTP
c       IMPLICIT DOUBLE PRECISION (A-H,O-Z)
        common /plot/iplot,IPLE,IPWAK,IPTIP,ipwings,ipfslg,iforbody
        dimension xrf(200),yrf(200),zrf(200),xlf(200),ylf(200),zlf(200)
        COMMON /COUNTE/ ILFOR, ILAFT, ILMAX, ISY
        COMMON /INOUT/ INPT,JPT
        idk = 28
        read (idk, 4,end=8) ttt,ILMAX,ILFOR,ILAFT
        max = ilmax - ilfor +1
        read (idk,5) tttl
        read (idk,50)
```

```
      read (idk,60) (XRF(JJ),JJ=1, max)
      read (idk,60) (YRF(JJ),JJ=1,max)
      read (idk,60) (ZRF(JJ),JJ=1,max)
      read (idk,70)
      read (idk,60) (XLF(JJ),JJ=1,max)
      read (idk,60) (YLF(JJ),JJ=1,MAX)
      read (idk,60) (ZLF(JJ),JJ=1,MAX)
    8 continue
      call j1styl (3)
      if (iforbody .eq. 0) go to 6
      do 2 i = 1, max
      if ( i .eq. 1 ) call j3move ( xrf(1), yrf(1), zrf(1))
      if ( xrf(i) .eq. 0. .and. yrf(i) .eq. 0. .and.
     1zrf(i) .eq. 0. ) go to 2
      call j3draw ( xrf(i), yrf(i), zrf(i) )
  2   continue

      do 3 i = 1, max
      if ( i .eq. 1 ) call j3move ( xlf(1), ylf(1), zlf(1))
      if ( xlf(i) .eq. 0. .and. ylf(i) .eq. 0. .and.
     1zlf(i) .eq. 0. ) go to 3
      call j3draw ( xlf(i), ylf(i), zlf(i) )
  3   continue
  6   continue

   60 FORMAT(1X,8F12.5)
   50 format (a47)
   70 format (a45)


    4 format (a18,3i12)
    5 format (a25 )

  333 RETURN
      END
C...

      FUNCTION FUR(X)
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),
     1DDF(20)
      IF (IFR .NE. 0) GO TO 10
C
C  * DEFINE THE FUSELAGE RADIUS AS A FUNCTION OF X *
C
C     F106B,ASSUMED TO BE SIMILAR TO THAT OF NASA MEMO-
C     10-5-58A FROM NOSE TO C.G.
      IF(X.GT.3.4583) GO TO 2
      A1=2.*(X+0.3742)/7.665
      A2=(1.-A1)**2
      A3=(1.-A2)**0.75
      FUR=0.2892*A3
      GO TO 5
    2 FUR=0.2892
      GO TO 5
   10 CONTINUE
      K=1
   12 IF (X.GE.XFF(K) .AND. X.LT.XFF(K+1)) GO TO 15
      K=K+1
      IF (K .GE. IFN) GO TO 20
      GO TO 12
   15 SM=X-XFF(K)
      FUR=AAF(K)*SM**3+BBF(K)*SM**2+CCF(K)*SM+DDF(K)
      GO TO 5
   20 IF (X .LT. XFF(1)) GO TO 25
      K=IFN-1
      GO TO 15
   25 K=1
      GO TO 15
    5 RETURN
      END

C************************
      FUNCTION SLOP (X)
      COMMON /FUSRAD/ IFR,IFN,XFF(21),RFF(21),AAF(20),BBF(20),CCF(20),
     1DDF(20)
      IF (IFR .NE. 0) GO TO 10
C
C  * DEFINE THE DERIVATIVE OF FUSELAGE RADIUS WITH DIMENSIONAL X
C    MULTIPLIED BY RADIUS, OR, =R(DR/DX) . *
C
```

```
C     F106B
      IF(X.GT.3.4583) GO TO 2
      A1=2.*(X+0.3742)/7.665
      A2=1.-A1
      A3=SQRT(1.-A2*A2)
      SLOP=0.032734*A2*A3
      GO TO 5
    2 SLOP=0.
      GO TO 5
   10 CONTINUE
      K=1
   12 IF (X.GE.XFF(K) .AND. X .LT. XFF(K+1)) GO TO 15
      K=K+1
      IF (K .GE. IFN) GO TO 20
      GO TO 12
   15 SM=X-XFF(K)
      SLOP=3.*AAF(K)*SM**2+2.*BBF(K)*SM+CCF(K)
      SLOP=SLOP*FUR(X)
      GO TO 5
   20 IF (X .LT. XFF(1)) GO TO 25
      K=IFN-1
      GO TO 15
   25 K=1
      GO TO 15
    5 RETURN
      END

C***********************
      subroutine flgcal
      COMMON /FUS/ XF(20),XCF(20),RF(20),SNP(5,20),XLEF,XTEF,WARD(20),
     1CSF(5,20),XAS(6),F0,F10,WKN,RDX,X1,NCUM,NF,NT,NKF(5),XF,NTL,LWF
      common /fusrad/ ifr,ifn,x(21),rad(21),aaf(20),bbf(20),ccf(20),
     1ddf(20)
      dimension p1(20),p2(20),p3(20),p4(20),p5(20),p6(20)
      xmin =xas(1)
      xmax=xas(2)
      xc=3.4583
      x(1) = xmin
      rad(1) = 0.
      l = 1
      do 3 i = 2, 20
      x(i) = x(1) + 0.5*(i-1)
      rad(i) = fur (x(i))
      l = l + 1
      if ( x(i) .gt. xc)  go to 4
 3    continue
 4    continue
      x(l) = xc
      rad(l) = fur ( x(l) )
      l = l + 1
      x(l) = xmax
      rad (l) = fur ( x(l) )
  100 format (1x,8f12.4)
      d=0
      ifnl=l - 1
      do 1 i=1,ifnl
      rad2=rad(i+1)
      rad1=rad(i)
      dl=x(i+1)-x(i)
      xc1=0.5*dl
      xc2=xc1+d
      d=d+dl
      p1(i)=xc2
      p2(i)=0.0
      p3(i)=0.0
      p4(i)=rad2
      p5(i)=rad1
      p6(i)=dl
 1    continue
      call jopst ('cylin')
      do 2 j=1,ifnl
      call jsedfl (1)
      call jcylin (p1(j),p2(j),p3(j),p4(j),p5(j),p6(j),12,0)
 2    continue
      call jclst ('cylin')
      call jtrvst ('cylin')
      return
      end
```

```
c********************************

      subroutine flgunsym
      COMMON/SRCT/ISYM,JSCT,TSF(21,21),RSF(21,21)
      common /fusrad/ ifr,ifn,x(21),rad(21),aaf(20),bbf(20),ccf(20),
     1ddf(20)
c********************************
cccc      To get the wings without fill ( i.e. line frames ) the data set
cccc       should have ihide =1 .
cccc       This subroutine is used for unsymmetrical flg e.g. ellipse etc.
c********************************

      pi=3.14159265
      do 1 i = 1, ifn
      xx = x(i)
      yy = 0.
      zz = 0.
c**********************
      x1 = x(i)
      theta = tsf (i,1)
      theta = theta * pi/180.
      y1 = rsf (i,1) * sin (theta)
      z1 = rsf (i,1) * cos (theta)
      x3 =x1
      call j3move (x1,y1,z1)
      do 3 k = 1,jsct
      theta = tsf( i, k)
      theta = theta * pi/180.
      y3 = rsf (i,k)* sin (theta)
      z3 = rsf (i,k)* cos (theta)
      call j3draw (x3,y3,z3)
    3 continue
      call j3move (x1,-y1,z1)
      x4 = x1
      do 4 kk= 1, jsct
      theta = tsf (i,kk)
      theta = theta * pi/180.
      y4 = rsf (i,kk) *sin (theta)
      z4 = rsf (i,kk) *cos (theta)
      call j3draw (x4,-y4,z4)
    4 continue

      do 2 j = 1,jsct,2
      x1 = x (i)
      theta = tsf (i,j)
      theta = theta * pi/180.
      y1 = rsf (i,j) * sin( theta)
      z1 = rsf (i,j) * cos( theta)
      call j3move (x1,y1,z1)
      theta = tsf (i,j)
      theta = theta * pi/180.
      ii = i+1
      if ( ii .gt. ifn ) go to 2
      x2 = x (ii)
      y2 = rsf (ii,j) *sin ( theta)
      z2 = rsf (ii,j) *cos ( theta)
      call j3draw ( x2, y2, z2)
      call j3move (x1,-y1,z1)
      call j3draw (x2,-y2,z2)
    2 continue
    1 continue
      return
      end
```

```
                F-16XL WITH FREE VORTEX FILAMENTS
GROUP 2 NCASE,NGRD,NSUR
1 0  2
GROUP 3 LAT,IBLC,KT,IBD,NLDMM
1 1 1 1 0
GROUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
2 7 4 2 0 0
GROUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
1 1 0 0 0 0 0
GROUP 6 DF
0.
GROUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
6 0 0 0 0 0 0 0
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
1.38 10.0 .4 8.0  10.3  2.8  0. 0.
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
8.0 10.3 2.8 9.5 10.5 4.05 0. 0.
GROUP 24. ICNLE
0
GROUP 25. RC
.0007
GROUP 26 TWST,RINC,TINP
0. 0. 0.
GROUP 4 NC,M1(I),I=1,NC,NWING,IWGLT,IPOS
2  3   5 0 0 0
GROUP 5 NFP,NJW,NVRTX,MVRTX,NLEF,IV,NAL
1 1 0 0 0 1 0
GROUP 6 DF
0.
GROUP 7 NW(1),NW(2),ICAM,IST,ICAMT,ITHCK,NST,NDIT
5 0 0 0 0 0 0 0
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
8.3  11.8  .0  9.5  11.8  .4  .4 90.
GROUP 17 IPN
0
GROUP 18 XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
9.5  11.18  .4  10.25  11.1 1.4 .4 90.
GROUP 24. ICNLE
0
GROUP 25. RC
.0
GROUP 26 TWST,RINC,TINP
0.  0.  0.
GROUP 39 AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
0.1  2.15  18.82 6.08 4.05 6.7 0.
GROUP 40 ALNM,SNUM,DVRTX,CLDS
2.  1.  0.  0.
GROUP 41. ALPA
50.  30.
GROUP 42 SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
1. 7. 1.84  7.045 9.15 2.8 3.8 1.
GROUP 43 HEIGHT,ATT
0.  0.
GROUP 44 P,BK,RL
.01 0.08 0.
GROUP 45 KF,NT,NCUM,NF,IBY,IBCM
1   2  8  16  1  0
GROUP 46 XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
0.  12.  1.  9.  0.  0.8  0.8  1.38
GROUP 47 ISYM,JSCT
1  0
GROUP XFF
0.  0.5  1.0  1.38 3. 6. 8. 10. 12.
GROUP RFF
0.  .2  .3  .4  .4 .4 .4 .4 .4
GROUP XFD
0. 1. 2. 3. 4. 5. 6. 7. 12.
GROUP 51 RFD
0. .3 .55 .8 .75 .7 .65 .6 .6
GROUP 57. IFORB1
  1
GROUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
  0 1 0 0 0
GROUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
```

```
  0.  0.  0.  0.25  0
GROUP 60. XORING(I), I=1,6
  0.04  1.23  -0.62  1.71  0.33  0.15
GROUP 69. IWAKE
  0
GROUP 79. LEV
  1
GROUP 80. NSUF,NPC,ICP,MSTW,MITE
  1  0  1  0  10
GROUP 81. ITIPV,MST
  0  0
GROUP 82. MULTIG,KITR
  1  4
GROUP 83. DELTA,DELT,XEND
  0.8  0.9  10.
GROUP 84. NBRR
  0
GROUP 86. DIF1,DIF2
  1.25  1.25
GROUP 87. NQ1,IREA,ISTAR
  2  0   0
PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1     1     1     1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    6.     0.     0.     6.     0.     15.     75.
```

```
This file lists plot options for different views. A value of 1  is for
plotting different options, and 0 does not plot it.


****  TOP VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1     1      1     1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    6.    0.    0.    6.    0.    15.    75.


**** PERSPECTIVE VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1     1      1     1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    5.    0.    0.    -6.   3.    3.    45.


**** SIDE VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1     1      1     1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    10.   0.    0.    10.   8.    0.    110.


**** FRONT VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1     1      1     1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    0.    0.    0.    15.   0     0.  90.
```

```
     F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT
GROUP 2. NCASE, NGRD, NSUR
1 0 3
GROUP 3. LAT, IBLC, KT, IBD, NLDMM
1 0 1 1 1
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS
3 3 3 4 3 0 0
GROUP 5. NFP, NJW(I).I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1 1 0 0 0 0 0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
6 0 0 0 0 0 0 0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
5.25 9.25 0.5 6.8 9.2 1.23 -.12 0.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
6.8  9.2  1.23 7.337 9.091 2.13 -.12 0.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
7.337 9 091 2.13 8.28  8.9  3.71  -.12 0.
GROUP 24. ICNLE
0
GROUP 25. RC
.00146
GROUP 26. TWST,RINC,TINP
0.  0.  0.
GROUP 30. INMM, NARM
       14         1
GROUP 31. ALPO, YIB, YOB, CLCD, PARMF
-0.71     0.5       3.71     0.  0.5
GROUP 32. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 33. CL (INMM-VALUES)
 -0.2144  0.4478  0.7790  0.9657  0.9126  0.9090  0.9056  0.8966  0.9077
  0.9454  1.0474  1.1508  1.2126  1.2397
GROUP 34. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 35. CD (INMM-VALUES)
  0.00^3  0.0098  0.0114  0.0132  0.0175  0.0392  0.0535  0.0814  0.1153
  0.1935  0.3111  0.4519  0.5923  0.7291
GROUP 36. XMRF
  0.2500
GROUP 37. AW (ANGLES OF ATTACK, INMM-VALUES)
 -3.0000  3.0000  6.0000  8.5000  9.5000 11.0000 12.0000 14.0000 16.0000
 20.0000 24.0000 28.0000 32.0000 36.0000
GROUP 38 CM (INMM-VALUES)
 -0.0285 -0.0526 -0.0636 -0.0720 -0.0394 -0.0610 -0.0754 -0.1044 -0.1106
 -0.1201 -0.1513 -0.1882 -0.2188 -0.2445
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR H.T.
2 3 3 2 0 0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1 1 1 0 0 0 0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
6 0 0 0 0 0 0 0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
10.5  12.12  0.5  10.947 12.066 1.23  -.31  -5.
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
10.947 12.066 1.23 11.5  12  2.13  -.31  -5.
GROUP 24. ICNLE
0
GROUP 25. RC
.00146
GROUP 26. TWST,RINC,TINP
0  0.  0.
GROUP 30. INMM,NARM
0  0
GROUP 4. NC, M1(I),I=1,NC, NWING, IWGLT, IPOS, FOR V.T.
```

```
1 6 1 0 0
GROUP 5. NFP, NJW(I),I=1,NFP, NVRTX, MVRTX, NLEF, IV, NAL
1 1 1 0 0 1 0
GROUP 6. DF
0.
GROUP 7. NW(1),NW(2), ICAM, IST, ICAMT, ITHCK, NST, NDIT
5 0 0 0 0 0 0 0
GROUP 17. IPN
0
GROUP 18. XXL(1),XXT(1),YL(1),XXL(2),XXT(2),YL(2),ZS,DIHED
9.8 12.5 0. 11.2 11.9 2.0 .4 90.
GROUP 24. ICNLE
0
GROUP 25. RC
 00146
GROUP 26. TWST,RINC,TINP
0. 0. 0.
GROUP 30. INMM,NARM
0 0
GROUP 39. AM,RN,HALFSW,CREF,BREF2,XREF,ALPCON
.1 .56 7.57 2.278 3.71 7.4 0.
GROUP 40. ALNM,SNUM,DVRTX,CLDS
2. 1. 0. 0.
GROUP 41. ALPA
40. 35.
GROUP 42. SNI,SNE,CTILT,SLETH,XCNTD,YCNTD,XTILT,SR
1. 3. 2.45 1.71 8. 1.23 1.37 1.
GROUP 43. HEIGHT,ATT
0. 0.
GROUP 44. P,BK,RL
0.02 0.08726 0.02
GROUP 45. KF,NT,NCUM,NF,IBY,IBCM
1 2 9 15 1 1
GROUP 46. XAS(1),XAS(2),FUSIND,FUSNO,FSHAP,X1,X2,X3
0. 13. 1. 14. 0. 0.86 0.86 3.5
GROUP 47 ISYM,JSCT
 1 0
GROUP 48. XFF, FUSNO-VALUES
 0.000  0.250  0.500  0.750  1.000  1.250  1.500  1.750  2.000
 2.250  2.500  2.750  3.500  13.000
GROUP 49. RFF
 0.000  0.070  0.135  0.194  0.247  0.296  0.339  0.377  0.410
 0.437  0.460  0.477  0.500  0.500
GROUP 50. XFD FUSNO-VALUES
0. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.
GROUP 51. FUSELAGE RADII IN SIDE VIEW
0. .2 .35 .45 .65 .65 .65 .65 .6 .5 .4 .4 .4 .4
GROUP 54. NBCM
6
GROUP 55. XBCM, NBMC-VALUES
0. 3. 5. 7. 10. 13.
GROUP 56. ZBCM
-0.3 -0.12 0. 0. 0. 0.
GROUP 57. IFORB1
  1
GROUP 58. IPRINT,IXCASE,ISY,ISHARP,NCIRCLE
  0 1 0 0 0
GROUP 59. BSEP,COEFF1,COEFF2,COEFF3,CSEP
  0. 0. 0. 0.25 0
GROUP 60. XORING(I), I=1,6
  0.11 1.32 -0.81 2.05 0.55 0.36
GROUP 69. IWAKE
  0
GROUP 79. LEV
  1
GROUP 80. NSUF,NPC,ICP,MSTW,MITE
  1 0 8 0 8
GROUP 81. ITIPV,MST
  0 0
GROUP 82. MULTIG,KITR
  1 4
GROUP 83. DELTA,DELT,XEND
  0.3 0.55 7.
GROUP 84 NBRR
  0
GROUP 86. DIF1,DIF2
  .5 .5
GROUP 87. NQ1,IREA,ISTAR
  2 0 0
PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
```

```
        1     0     1     0     1     1      1      1
    PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
        4.    0.    0.    4.    0.    10.    90.
```

```
This file lists plot options for different views. A value of 1  is for
plotting different options, and 0 does not plot it.


****  TOP VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1      1      1      1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    4.    0.    0.    4.    0.     10.     90.


**** PERSPECTIVE VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1      1      1      1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    5.    0.    0.    -6.    2.    3.    45.


**** SIDE VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1      1      1      1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    8.    0.    0.    8.    6.     0.    110.


**** FRONT VIEW ****

PLOT GROUP 1. IPLOT,IPLE,IPWAK,IPTIP,IPWINGS,IPFSLG,IHIDE,IFORBODY
    1     0     1     0     1      1      1      1
PLOT GROUP 2. XR,YR,ZR,XE,YE,ZE,VA (VIEW ANGLE: ZOOM)
    0.    0.    0.    20.    0. 0. 90.
```

```
RIGHT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=30.000  MACH NUMBER= 0.100  ITERATION NUMBER= 1
    SIDESLIP ANGLE =      4.584 DEGREES
1

LEADING EDGE ELEMENTS      SURFACE # 1      STRIP # 11
*********************      ***********      *********
 **** 1       1      23  ****
 10.0253   2.0392   1.4881   1.3800   0.9490   1.8110   2.5038   3.2222   3.9405   4.6588   5.3772   6.0955   6.8138   7.5322
  8.2505   8.9688   9.6872  10.4055  13.2055  16.0055  18.8055  21.6055  24.4055
  0.6022   0.6022   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
  0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
  0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
 **** 1       2      21  ****
 10.0667   2.9415   2.0392   1.9378   1.5335   2.2784   3.0499   3.8488   4.6134   5.3669   6.1225   6.8759   7.6219   8.3530
  9.0711   9.3086  12.2094  14.6179  16.8056  18.3689  20.8098
  0.9333   0.9333   0.6022   0.6022   0.6022   0.8205   0.6861   0.7083   0.9620   1.2547   1.5384   1.8229   2.1267   2.4686
  2.8405   3.1719   4.5858   5.5863   6.1364   6.8879   7.0042
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4870   0.6508   0.5272   0.4559   0.4310   0.4832   0.5569   0.6303   0.6816
  0.6933   0.7092   0.4310   1.4498   3.1084   4.8457   6.8605
 **** 1       3      19  ****
 10.1207   4.1204   2.9415   2.8511   2.4903   3.1845   3.8106   4.6019   5.4859   6.3334   7.1623   7.9581   8.7029   9.3996
 11.2673  13.5437  15.8819  18.5313  20.8223
  1.3659   1.3659   0.9333   0.9333   0.9333   1.1302   1.0662   0.7241   0.6022   0.6022   0.8004   1.2242   1.7329   2.3038
  4.3919   5.1982   5.6310   6.0153   5.3324
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9248   1.1900   1.0586   0.7500   0.4548   0.4310   0.4310   0.4310
  0.4310   1.8479   3.3262   4.1467   5.6045
 **** 1       4      17  ****
 10.1793   5.3965   4.1204   4.0443   3.7404   4.3215   4.9457   5.8531   6.7962   7.7575   8.7139   9.6502  10.5777  12.9309
 14.8988  17.3534  19.8118
  1.8341   1.8341   1.3659   1.3659   1.3659   1.5435   1.6158   1.4476   1.1387   0.8249   0.6275   0.6022   0.8985   2.4104
  4.4023   5.2679   5.4758
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9262   1.3434   1.5455   1.4912   1.2226   0.8375   0.5588   0.4310
  0.4310   1.4632   2.7873
 **** 1       5      15  ****
 10.2333   6.5754   5.3965   5.3357   5.0936   5.5552   6.1527   7.2601   8.4255   9.6044  10.7755  13.4659  16.1636  18.3496
 21.5388
  2.2667   2.2667   1.8341   1.8341   1.8341   1.9807   2.1299   2.0547   1.8844   1.6443   1.3385   0.6046  -0.0242  -0.0826
 -0.8625
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9417   1.4256   1.7068   1.8439   1.8797   1.6285   1.2196   0.4310
  0.4310
 **** 1       6      15  ****
 10.2747   7.4777   6.5754   6.5289   6.3437   6.6965   7.2866   8.1427   9.0354   9.9401  10.8430  13.4634  15.7316  18.3175
 20.9921
  2.5978   2.5978   2.2667   2.2667   2.2667   2.3797   2.6018   2.6236   2.6407   2.6190   2.5335   2.9095   3.4637   3.3560
  3.2351
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9234   1.2759   1.5220   1.7185   1.9061   0.9941   2.5394   3.6078
  4.4275
 **** 1       7      15  ****
 10.3000   8.0288   7.4777   7.4422   7.3005   7.5656   8.1868   8.8765   9.5409  10.1236  12.2344  14.3963  16.3800  18.4933
 20.6788
  2.8000   2.8000   2.5978   2.5978   2.5978   2.6975   3.0357   3.1435   3.3881   3.7849   5.5538   5.9382   5.6234   4.9191
  3.9300
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8049   0.9240   0.9094   0.8425   1.3479   3.0853   5.0361   6.7325
  8.1766
 **** 1       8      15  ****
 10.3412   8.3346   8.0283   8.0000   7.8850   8.0676   8.6347   8.9148   9.0904   9.4628  11.9474  14.5204  17.2276  19.9852
 22.7621
  3.0576   3.0576   2.8000   2.8000   2.8000   2.9399   3.5011   3.9952   4.0564   3.9421   2.7203   1.9364   1.3015   0.8388
  0.5537
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.4896   0.5791   1.1232   1.5462   1.9632   2.7413   3.0698   3.2160
  3.4346
 **** 1       9      15  ****
 10.4000   8.7707   8.3346   8.3092   8.2076   8.3274   9.0304   9.4395   9.7803  10.0919  12.2977  14.9695  17.3581  19.7044
 22.1022
  3.4250   3.4250   3.0576   3.0576   3.0576   3.2217   3.4962   3.7911   4.1440   4.3572   5.4344   4.9936   4.3301   4.5376
  4.1519
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.6966   0.7577   0.8896   1.2295   2.5763   3.2884   4.7402   6.2401
  7.6336
 **** 1      10      15  ****
 10.4588   9.2067   8.7707   8.7500   8.6675   8.7680   9.1120   9.4490   9.8330  10.2445  12.6697  15.3397  17.8640  20.3730
 22.9633
  3.7924   3.7924   3.4250   3.4250   3.4250   3.5558   3.7497   3.6072   3.4832   3.4914   4.3546   4.1619   3.9242   3.5330
  3.1165
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.1268   1.3173   1.4031   1.3764   2.4779   3.2988   4.4868   5.6666
  6.6449
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 **** 1      11      14  ****
  10.4951   9.4762   9.2067   9.1908   9.1274   9.1972   9.6405   9.8413  10.0430  12.7121  15.2690  17.6211  19.8244  22.0202
   4.0194   4.0194   3.7924   3.7924   3.7924   3.8982   4.0823   4.0189   3.8158   4.6515   5.2772   5.8633   6.1220   6.0637
   0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.0711   1.3079   1.4442   1.3131   2.2675   3.6689   5.3773   7.1138
1

WAKE ELEMENTS      SURFACE # 1      STRIP # 12
*************      ***********      *********
 **** 1       1       8  ****
  10.0000  10.4310  11.2930  13.5430  15.7930  18.0430  20.2930  22.5430
   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
 **** 1       2       8  ****
  10.0253  10.4563  11.0698  12.8644  14.9022  16.9023  18.9948  20.9130
   0.6022   0.6022   0.7052   1.3582   1.5297   2.5045   3.0093   4.0917
   0.0000   0.0000   0.5967   1.7865   2.7247   3.0588   3.7139   4.1740
 **** 1       3       8  ****
  10.0667  10.4977  11.2590  13.3100  15.3189  17.3694  19.3468  21.3247
   0.9333   0.9333   1.2295   1.9496   2.7859   3.5547   4.6074   5.5695
   0.0000   0.0000   0.2750   0.8560   1.4283   1.9449   2.1549   2.6292
 **** 1       4       8  ****
  10.1207  10.5517  11.3533  13.4789  14.8547  16.7575  18.9030  20.8065
   1.3659   1.3659   1.6261   2.3424   3.3389   4.4720   5.1483   5.7767
   0.0000   0.0000   0.1810   0.3575   1.8330   1.4355   1.3942   2.4161
 **** 1       5       8  ****
  10.1793  10.6103  11.4425  13.6360  15.7842  17.8596  19.8668  21.8478
   1.8341   1.8341   2.0576   2.4460   2.7290   3.1694   3.7888   4.4472
   0.0000   0.0000  -0.0211   0.2954   0.9017   1.6510   2.4572   3.2966
 **** 1       6       8  ****
  10.2333  10.6643  11.4055  13.6271  15.8711  17.9802  19.9776  21.9315
   2.2667   2.2667   2.6094   2.9010   2.8521   2.8[illegible]47   2.9029   3.0905
   0.0000   0.0000  -0.2762  -0.0720   0.0853   0.8687   1.9024   3.0021
 **** 1       7       8  ****
  10.2747  10.7057  11.1905  13.3817  15.3444  17.4137  19.4948  21.5102
   2.5978   2.5978   3.2669   3.7560   4.8190   5.2259   5.4619   5.5528
   0.0000   0.0000  -0.2456  -0.0978  -0.3812   0.4029   1.2252   2.2213
 **** 1       8       8  ****
  10.3000  10.7310  11.2896  12.7871  14.8828  16.3350  17.8529  19.3553
   2.8000   2.8000   3.4427   4.5743   5.3045   6.5444   7.5374   8.1257
   0.0000   0.0000  -0.1340   1.1066   0.7362   1.9263   3.2577   4.8259
 **** 1       9       8  ****
  10.3412  10.7722  11.2018  12.9546  14.9614  16.8900  18.7850  20.6901
   3.0576   3.0576   3.8037   5.0384   5.6557   6.4230   7.0537   7.5479
   0.0000   0.0000  -0.0432  -0.7257   0.0829   0.9515   1.9876   3.0780
 **** 1      10       8  ****
  10.4000  10.8310  11.0626  12.6185  14.3767  16.0909  17.7688  19.3878
   3.4250   3.4250   4.2181   5.8396   6.8555   7.5404   8.0145   8.3027
   0.0000   0.0000  -0.2456  -0.1338   0.8354   2.1218   3.5439   5.0796
 **** 1      11       8  ****
  10.4588  10.8898  11.0270  12.0422  13.5478  14.9992  16.4225  17.8968
   3.7924   3.7924   4.6424   6.5912   7.4069   7.7676   7.7518   7.3761
   0.0000   0.0000  -0.0411   0.4426   1.9021   3.5831   5.3257   6.9833
 **** 1      12       8  ****
  10.4951  10.9261  11.1386  12.3325  13.7101  15.0686  16.4580  18.0547
   4.0194   4.0194   4.8280   6.4758   7.1620   7.2075   6.7633   6.0185
   0.0000   0.0000  -0.2099   0.7501   2.3915   4.1845   5.8975   7.2971
LEFT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=30.000  MACH NUMBER= 0.100  ITERATION NUMBER= 1
   SIDESLIP ANGLE =      4.384 DEGREES
1

LEADING EDGE ELEMENTS      SURFACE # 1      STRIP # 11
*********************      ***********      *********
 **** 1       1      23  ****
  10.0253   2.0392   1.4881   1.3800   0.9490   1.8110   2.5038   3.2222   3.9405   4.6588   5.3772   6.0955   6.8138   7.5322
   8.2505   8.9688   9.6872  10.4055  13.2055  16.0055  18.8055  21.6055  24.4055
  -0.6022  -0.6022  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
   0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
 **** 1       2      21  ****
  10.0667   2.9415   2.0392   1.9378   1.5335   2.2809   3.0661   3.8469   4.6012   5.3503   6.0965   6.8471   7.5830   8.3111
   9.0000   9.7038  12.1770  13.9508  16.0572  18.1636  20.2801
  -0.9333  -0.9333  -0.6022  -0.6022  -0.6022  -0.8457  -0.8032  -0.9330  -1.2240  -1.5273  -1.8384  -2.1357  -2.4691  -2.8211
  -3.2447  -3.6116  -4.8928  -6.4917  -7.5167  -8.3297  -8.9990
   0.0000   0.0000   0.0000   0.0000   0.0000   0.4710   0.6182   0.4521   0.4310   0.4599   0.4825   0.5312   0.5677   0.5676
   0.5623   0.7176   0.4310   1.8929   3.4266   5.0826   6.7891
 **** 1       3      19  ****
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 10.1207   4.1204   2.9415   2.8511   2.4903   3.1743   3.7662   4.5874   5.4622   6.2958   7.1208   7.8774   8.5850   9.2763
 11.1800  13.0977  15.2185  17.0684  18.9833
 -1.3659  -1.3659  -0.9333  -0.9333  -0.9333  -1.1631  -1.1404  -0.8106  -0.7126  -0.8117  -1.1256  -1.6166  -2.1759  -2.7552
 -4.8085  -5.9899  -6.7484  -7.5654  -7.2128
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9688   1.1429   0.9463   0.6164   0.4310   0.4310   0.4310   0.4310
  0.4310   2.0943   3.7577   5.6943   7.7065
**** 1        4       17 ****
 10.1793   5.3965   4.1204   4.0443   3.7404   4.3120   4.9194   5.8290   6.8027   7.7917   8.7452   9.6105  10.4542  12.4468
 14.8794  17.2287  19.6159
 -1.8341  -1.8341  -1.3659  -1.3659  -1.3659  -1.5720  -1.7394  -1.6024  -1.3715  -1.1903  -1.1447  -1.2983  -1.8477  -3.8148
 -5.1451  -6.2648  -7.0134
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9241   1.3476   1.5035   1.3817   1.0435   0.5402   0.4310   0.4310
  0.9224   1.8552   3.1125
**** 1        5       15 ****
 10.2333   6.5754   5.3965   5.3357   5.0936   5.5465   6.1102   7.2068   8.3843   9.5886  10.7913  13.5759  16.2965  18.7029
 20.8481
 -2.2667  -2.2667  -1.8341  -1.8341  -1.8341  -2.0057  -2.2855  -2.2708  -2.1611  -2.0463  -1.9600  -1.9784  -1.6754  -3.0686
 -4.9681
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9249   1.4381   1.6984   1.7515   1.6408   1.3485   0.7596   0.4310
  0.4310
**** 1        6       15 ****
 10.2747   7.4777   6.5754   6.5289   6.3437   6.6882   7.2378   8.0812   8.9835   9.8147  10.6800  13.1565  15.7186  18.3013
 20.9216
 -2.5978  -2.5978  -2.2667  -2.2667  -2.2667  -2.4030  -2.7895  -2.8238  -2.9925  -3.3713  -3.6834  -4.3463  -4.6500  -4.8338
 -4.9691
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8652   1.2461   1.3689   1.5213   1.6291   2.7550   3.8427   4.9084
  5.8860
**** 1        7       15 ****
 10.3000   8.0288   7.4777   7.4422   7.3005   7.5564   8.1565   8.7531   9.2412   9.7863  12.4182  14.7277  17.0100  19.2559
 21.5261
 -2.8000  -2.8000  -2.5978  -2.5978  -2.5978  -2.7192  -3.2102  -3.5695  -4.0824  -4.5205  -5.1463  -5.9697  -6.6770  -7.1337
 -7.3210
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.6283   0.7563   0.7467   0.8584   1.5803   2.9201   4.3894   5.9979
  7.6261
**** 1        8       15 ****
 10.3412   8.3346   8.0288   8.0000   7.8850   8.0555   8.7108   9.0600   9.3388   9.6032  11.3986  13.4423  15.6101  18.0141
 20.5613
 -3.0576  -3.0576  -2.8000  -2.8000  -2.8000  -2.9544  -3.4132  -3.8700  -4.3729  -4.8165  -6.4395  -6.6862  -6.4513  -6.0412
 -5.6842
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.4310   0.4310   0.4310   0.6840   2.0919   3.9898   5.7464   7.1222
  8.2287
**** 1        9       15 ****
 10.4000   8.7707   8.3346   8.3092   8.2076   8.3098   8.4590   8.8671   9.2358   9.7184  12.5054  15.1749  17.8849  20.6240
 23.3802
 -3.4250  -3.4250  -3.0576  -3.0576  -3.0576  -3.2333  -3.1507  -3.1595  -2.9861  -2.8390  -2.7441  -2.8617  -3.1061  -3.3223
 -3.5799
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.2126   1.5150   1.8184   1.8775   2.1306   2.9670   3.6275   4.1663
  4.5876
**** 1       10       15 ****
 10.4588   9.2067   8.7707   8.7500   8.6675   8.7436   9.2251   9.5662   9.9258  10.2299  11.6924  14.4746  17.2635  20.0271
 22.7690
 -3.7924  -3.7924  -3.4250  -3.4250  -3.4250  -3.5714  -3.6242  -3.5640  -3.6455  -3.7344  -1.8857  -1.5713  -1.7301  -2.1093
 -2.6413
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.0677   1.2917   1.4766   1.7407   3.2518   3.2313   3.0389   2.7962
  2.5984
**** 1       11       14 ****
 10.4951   9.4762   9.2067   9.1908   9.1274   9.1453   9.5977   9.7965  10.0294  12.2129  14.6607  17.2652  19.9618  22.7130
 -4.0194  -4.0194  -3.7924  -3.7924  -3.7924  -3.9179  -4.1781  -4.2007  -4.1704  -4.2245  -3.7614  -3.3353  -3.0634  -2.9254
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.0374   1.2832   1.4961   3.2480   4.5263   5.4618   6.1650   6.6666
:

WAKE ELEMENTS      SURFACE # 1      STRIP # 12
*************      ***********      *********
**** 1        1        8 ****
 10.0000  10.4310  11.2930  13.5430  15.7930  18.0430  20.2930  22.5430
 -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
**** 1        2        8 ****
 10.0253  10.4563  11.0817  12.8861  15.0562  17.0432  18.9178  20.6901
 -0.6022  -0.6022  -0.5743  -1.2515  -1.8411  -2.5119  -3.3768  -4.5369
  0.0000   0.0000   0.5925   1.7536   1.8290   2.6440   3.5386   4.2971
**** 1        3        8 ****
 10.0667  10.4977  11.3325  13.4538  15.2406  17.3368  19.2461  21.4612
 -0.9333  -0.9333  -1.0263  -1.6512  -2.9991  -3.6761  -3.7476  -3.6773
  0.0000   0.0000   0.1934   0.6083   0.8387   0.3803   1.5686   1.9571
**** 1        4        8 ****
 10.1207  10.5517  11.3776  13.5672  15.5541  17.3632  19.3424  21.4587
 -1.3659  -1.3659  -1.5811  -1.9958  -2.8019  -3.5502  -4.4761  -5.1788
  0.0000   0.0000  -0.1210   0.1890   0.8710   1.9799   2.5166   2.8168
**** 1        5        8 ****
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 10.1793  10.6103  11.2183  13.4276  15.5821  17.5728  19.4298  21.4096
 -1.8341  -1.8341  -2.3089  -2.7267  -3.1570  -3.4260  -3.0847  -3.7245
  0.0000   0.0000  -0.3846  -0.4679   0.0172   1.0308   2.2545   3.1110
 **** 1      6       8  ****
 10.2333  10.6643  10.9387  12.7032  14.6451  16.5175  18.3495  20.1319
 -2.2667  -2.2667  -3.0613  -4 3444  -5.3468  -6.3880  -7.3291  -8.2014
  0.0000   0.0000  -0.1908  -0.7411  -0.2061   0.4813   1.3872   2.4477
 **** 1      7       8  ****
 10.2747  10.7057  11.0067  11.6863  12.5213  13.8178  15.1218  16.4344
 -2.5978  -2.5978  -3.3857  -5.5050  -7.4137  -8.4816  -9.1543  -9.4173
  0.0000   0.0000   0.1775  -0.1536   0.6961   2.1931   3.8988   5.7072
 **** 1      8       8  ****
 10.3000  10.7310  11.0507  11.7947  13.1654  14.5888  15.9934  17.4127
 -2.8000  -2.8000  -3.5180  -5.5608  -7.2220  -8.3059  -9.2151  -9.9389
  0.0000   0.0000   0.3539  -0.2259   0.4253   1.7897   3.2940   4.8828
 **** 1      9       8  ****
 10.3412  10.7722  11.1626  11.7662  12.5716  13.3928  14.8024  16.5029
 -3.0576  -3.0576  -3.8020  -5.9549  -7.2114  -7.3685  -6.8654  -6.2430
  0.0000   0.0000   0.1913   0.4427   2.1265   4.2154   5.8954   7.2308
 **** 1     10       8  ****
 10.4000  10.8310  11.6125  13.1479  14.7017  16.6116  18.5490  20.4771
 -3.4250  -3.4250  -3.7024  -5.3472  -6.9068  -7.5723  -8.1637  -8.6442
  0.0000   0.0000  -0.2352  -0.2399  -0.7045   0.2813   1.2607   2.3163
 **** 1     11       8  ****
 10.4588  10.8898  11.4040  11.8106  12.8663  13.4472  14.7588  16.4660
 -3.7924  -3.7924  -4.1875  -6.3064  -7.1366  -7.6449  -7.1739  -6.3734
  0.0000   0.0000  -0.5679   0.0703   1.8755   3.9890   5.7554   6.9831
 **** 1     12       8  ****
 10.4951  10.9261  11.3869  13.0212  14.4048  15.8184  17.1987  18.5262
 -4.0194  -4.0194  -4.5926  -6.0198  -7.3691  -8.3578  -9.1531  -9.7639
  0.0000   0.0000  -0.4496   0.1457   1.2981   2.7425   4.3315   6.0424
IIMAX,ILFOR,ILAFT         31          17          15
(X. Y AND Z-COORDINATES)
   THE RIGHT-SIDE FOREBODY VORTEX LOCATIONS
    1.35974     2.50453     3.69701     4.81544     5.80509     6.53301     7.56018     8.73065
    9.90404    11.08227    12.25239    13.41249    14.53363    15.61133    16.62523
   -0.07887    -0.19439    -0.25096    -0.59607    -1.26293    -1.88348    -1.82137    -1.64215
   -1.75138    -1.53034    -1.56078    -1.80026    -2.22752    -2.70799    -3.18484
    0.44703     0.78776     0.66610     0.40152     0.27542     1.00002     1.61733     1.81191
    1.58554     1.63944     1.37507     1.18317     1.20547     1.42390     1.85358
   THE LEFT-SIDE FOREBODY VORTEX LOCATIONS
    1.35974     2.51476     3.69910     4.77790     5.70400     6.60598     7.63470     8.82301
    9.99605    11.07820    12.25803    13.43769    14.59851    15.71090    16.74938
   -0.14754    -0.25493    -0.31914    -0.74199    -1.50477    -2.14188    -2.08745    -1.97041
   -2.21567    -1.75496    -1.65775    -1.80502    -2.10597    -2.52773    -2.98251
    0.46235     0.76957     0.58729     0.27524     0.29765     0.76725     1.38271     1.50189
    1.56387     1.80198     1.60564     1.44219     1.39823     1.55541     1.94876
RIGHT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=30.000  MACH NUMBER= 0.100  ITERATION NUMBER= 8
   SIDESLIP ANGLE =      4.584 DEGREES
1

LEADING EDGE ELEMENTS      SURFACE # 1      STRIP # 11
*********************      ***********      *********
 **** 1      1      27  ****
 10.0253   2.0392   1.4881   1.3800   0.9490   1.8110   2.5038   3.2222   3.9405   4.6588   5.3772   6.0955   6.8138   7.5322
  8.2505   8.9688   9.6872  10.4055  11.8055  13.2055  14.6055  16.0055  17.4055  18.8055  20.2055  21.6055  23.0055
  0.6022   0.6022   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
  0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
  0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
 **** 1      2      25  ****
 10.0667   2.9415   2.0392   1.9378   1.5335   2.3134   3.1068   3.8992   4.6534   5.4009   6.1479   6.9336   7.6912   8.4742
  9.2819  10.0753  11.4194  12.7139  14.0621  15.4083  16.6807  17.9063  19.1291  20.4943  21.4323
  0.9333   0.9333   0.6022   0.6022   0.6022   0.8183   0.7579   0.9162   1.1976   1.4614   1.5659   1.6359   1.6246   1.4323
  1.3705   1.5090   1.6131   2.1365   2.4905   2.7459   2.9801   3.2572   3.5522   3.3815   3.6850
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.5185   0.4582   0.5434   0.7110   1.0055   1.1863   1.4832   1.5736
  1.4607   1.3896   1.0869   1.0230   1.3279   1.7494   2.2838   2.9043   3.5643   3.8862   4.6506
 **** 1      3      22  ****
 10.1207   4.1204   2.9415   2.8511   2.4903   3.1152   3.7426   4.5845   5.4562   6.2576   7.0184   7.7853   8.5910   9.4324
 12.0472  13.1892  14.5925  15.8816  17.1561  18.4365  19.7379  21.1506
  1.3659   1.3659   0.9333   0.9333   0.9333   1,2981   1,1181   0.7931   0.7881   1.1575   1.6508   2.0623   2.3594   2.5950
  3.0810   2.8372   2.8441   2.9400   2.9827   2.7417   2.5692   2.9945
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8953   0.9514   0.7187   0.5119   0.5711   0.8123   1.0947   1.3203
  1.8710   2.5452   2.6548   3.1871   3.7739   4.3214   4.8046   5.6044
 **** 1      4      20  ****
 10.1793   5.3965   4.1204   4.0443   3.7404   4.2505   4.8386   5.7070   6.6718   7.6061   8.4529   9.2325   9.9793  11.0520
 12.0408  13.0191  13.9909  14.9816  16.0427  17.1118
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  1.8341   1.8341   1.3659   1.3659   1.3659   1.6991   1.6152   1.1592   0.9282   1.1639   1.7231   2.3916   3.0579   3.7532
  4.1606   4.2862   4.1925   3.8793   3.4655   2.6834
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9693   1.2298   1.0158   0.6904   0.5654   0.6194   0.8150   1.3856
  2.2782   3.2931   4.3162   5.2638   6.0889   6.8766
 **** 1      5      18  ****
 10.2333   6.5754   5.3965   5.3357   5.0936   5.4820   6.0505   6.8779   7.9774   9.0901  10.1034  11.1085  11.9119  12.9915
 14.2730  15.4268  16.6139  17.3260
  2.2667   2.2667   1.8341   1.8341   1.8341   2.1255   2.1516   1.5338   1.1315   1.3374   1.9637   2.9524   4.0774   4.9087
  5.1246   4.9709   4.7587   4.3237
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9977   1.6381   1.3270   0.8950   0.6495   0.6284   0.8643   1.1758
  1.6314   2.3967   3.0906   3.9537
 **** 1      6      18  ****
 10.2747   7.4777   6.5754   6.5289   6.3437   6.6418   7.2388   7.9594   8.7267   9.5020  10.2575  11.4576  12.7609  13.7905
 14.7895  15.7741  16.7815  17.4988
  2.5978   2.5978   2.2667   2.2667   2.2667   2.4887   2.5491   2.3739   2.0123   1.5154   1.1820   1.8906   2.4080   2.9757
  3.4166   3.6587   3.8438   3.9598
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9668   1.5350   1.9156   2.0019   1.5942   1.5424   1.5488   2.3213
  3.2085   4.1563   5.0703   6.4231
 **** 1      7      18  ****
 10.3000   8.0288   7.4777   7.4422   7.3005   7.5097   8.1320   8.7191   9.3534  10.0453  12.8246  13.8810  15.1026  16.3348
 17.4864  18.6124  19.8237  21.0535
  2.8000   2.8000   2.5978   2.5978   2.5978   2.7912   2.8976   2.8654   2.6883   2.5222   2.5105   2.7524   2.7891   2.8282
  2.8798   2.8509   2.5807   1.7854
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9383   1.3523   1.6501   1.7955   2.3776   3.2333   3.8932   4.5679
  5.3690   6.2092   6.7995   7.1973
 **** 1      8      18  ****
 10.3412   8.3346   8.0288   8.0000   7.8850   7.9687   8.4763   8.8774   9.2854   9.7066  12.2480  13.5644  14.9170  16.2717
 17.6524  19.0289  20.3973  21.7596
  3.0576   3.0576   2.8000   2.8000   2.8000   3.0257   3.2581   3.2143   3.0261   2.7516   2.0685   1.7401   1.5166   1.3412
  1.2686   1.1976   1.1698   0.7441
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4306   1.0590   1.5381   1.9311   2.2203   3.0008   3.2235   3.3692   3.4570
  3.5911   3.7745   4.0312   3.5926
 **** 1      9      18  ****
 10.4000   8.7707   8.3346   8.3092   8.2076   8.5572   9.1507   9.5349   9.9203  10.3148  12.7744  13.8207  15.0797  16.4081
 17.7503  19.0901  20.4316  22.0629
  3.4250   3.4250   3.0576   3.0576   3.0576   3.2067   3.4938   3.5826   3.6020   3.5596   2.9825   2.5629   2.0894   1.7677
  1.4710   1.3066   1.1295   0.4381
  0.0000   0.0000   0.0000   0.0000   0.0000   0.2617   0.7142   1.0468   1.3964   1.7185   3.0660   3.6522   4.1378   4.4501
  4.6234   4.8951   5.1999   5.0172
 **** 1     10      18  ****
 10.4588   9.2067   8.7707   8.7500   8.6675   9.0508   9.5998   9.8747  10.1415  10.4424  12.6983  13.8118  14.9751  16.1676
 17.3872  18.7079  20.0800  21.3862
  3 7924   3.7924   3.4250   3.4250   3.4250   3.5334   3.8477   3.9237   3.9426   3.9207   3.6860   3.3922   3.1011   2.7586
  2.4322   2.1709   2.2597   2.2388
  0.0000   0.0000   0.0000   0.0000   0.0000   0.2232   0.7067   1.0057   1.3158   1.5950   3.1345   3.9275   4.6106   5.2112
  5.7509   6.0816   6.2754   7.1769
 **** 1     11      17  ****
 10.4951   9.4762   9.2067   9.1908   9.1274   9.5081   9.9861  10.1673  10.3483  12.2497  13.3146  14.4378  15.6318  16.8940
 18.2234  19.5771  21.1293
  4.0194   4.0194   3.7924   3.7924   3.7924   3.8833   4.2312   4.3133   4.3632   4.0200   3.5248   2.9927   2.4365   1.9267
  1.5074   1.1503   0.5899
  0.0000   0.0000   0.0000   0.0000   0.0000   0.2232   0.7702   1.0219   1.2919   3.4784   4.2965   5.0027   5.5611   5.9950
  6.2740   6.5178   6.4139
1

WAKE ELEMENTS       SURFACE # 1      STRIP # 12
*************       ***********      *********
 **** 1      1      12  ****
 10.0000  10.4310  11.2930  12.4180  13.5430  14.6680  15.7930  16.9180  18.0430  19.1680  20.2930  21.4180
  0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000   0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
 **** 1      2      12  ****
 10.0253  10.4563  11.1934  12.0434  12.7042  13.2891  13.9087  14.5993  15.2623  15.9539  16.6793  17.2782
  0.6022   0.6022   0.8657   1.5829   2.4710   3.1412   3.6378   3.9611   4.1348   4.1105   3.9885   3.7550
  0.0000   0.0000   0.3851   0.6323   0.8756   1.5834   2.3988   3.2564   4.1769   5.0703   5.9286   6.8787
 **** 1      3      12  ****
 10.0667  10.4977  11.3197  12.3435  13.3009  14.1517  14.9183  15.6910  16.4669  17.3320  18.1764  18.9459
  0.9333   0.9333   1.1940   1.6036   2.1149   2.7201   3.1699   3.4735   3.7694   3.9866   4.0412   4.2397
  0.0000   0.0000   0.0964   0.3207   0.6124   1.0574   1.7623   2.5513   3.3369   4.0577   4.8306   5.6898
 **** 1      4      12  ****
 10.1207  10.5517  11.3023  12.1962  13.0560  13.8314  14.5512  15.2911  16.0897  16.8491  17.5430  18.1039
  1.3659   1.3659   1.7886   2.4172   2.9688   3.4420   3.9158   4.3215   4.6270   4.7053   4.7100   4.5792
  0.0000   0.0000   0.0967   0.4167   0.9171   1.5817   2.3024   3.0983   3.8806   4.7293   5.6365   6.6571
 **** 1      5      12  ****
 10.1793  10.6103  11.2869  11.5904  12.2000  13.0964  13.8219  14.6434  15.4442  16.2785  17.1113  17.8946
  1.8341   1.8341   2.3653   3.4055   4.3542   4.9359   5.4040   5.6581   5.7474   5.6901   5.6638   5.5081
  0.0000   0.0000   0.1074   0.4556   0.5875   0.9562   1.6805   2.4019   3.1888   3.9646   4.7432   5.4051
 **** 1      6      12  ****
 10.2333  10.6643  11.3588  11.9941  12.6531  13.5880  14.5607  15.3857  16.1824  17.0183  17.8983  18.9556
  2.2667   2.2667   2.8123   3.4149   4.2962   4.7438   5.1347   5.4492   5.6132   5.6700   5.6414   5.4502
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  0.0000   0.0000   0.0417   0.7463   0.9393   1.2206   1.5541   2.2493   3.0342   3.8070   4.5315   4.7293
 **** 1        7       12  ****
 10.2747  10.7057  11.3865  12.3345  13.1515  14.1242  15.1033  16.0731  17.0774  17.9464  18.7398  19.3499
  2.5978   2.5978   3.2316   3.5347   4.0882   4.4449   4.6804   4.5923   4.4080   4.5828   4.3927   4.3064
  0.0000   0.0000   0.0887   0.6757   1.2708   1.7543   2.3332   2.9829   3.3372   4.0273   4.8030   5.5918
 **** 1        8       12  ****
 10.3000  10.7310  11.4126  12.2738  13.1712  14.2091  15.3577  16.1952  17.0287  17.8635  18.6273  19.4026
  2.8000   2.8000   3.3985   3.9211   4.3559   4.8236   5.0129   5.2971   5.3818   5.2134   4.9275   4.3376
  0.0000   0.0000   0.0443   0.5581   1.0956   1.5493   1.6855   2.3810   3.1298   3.8643   4.6454   5.3129
 **** 1        9       12  ****
 10.3412  10.7722  11.3531  12.4490  13.5407  14.5285  15.4747  16.3990  17.2333  18.0910  18.9703  19.6795
  3.0576   3.0576   3.7322   4.2290   4.5037   4.5729   4.7022   4.8623   5.0150   5.1319   4.9755   4.7800
  0.0000   0.0000   0.1647   0.3051   0.7409   1.2963   1.9087   2.5392   3.2808   4.0068   4.6912   5.5076
 **** 1       10       12  ****
 10.4000  10.8310  11.7323  12.7856  13.7691  14.6650  15.5343  16.3316  17.0583  17.6985  18.4489  18.9746
  3.4250   3.4250   3.6652   3.8419   4.0743   4.2328   4.3423   4.4182   4.4056   4.3990   4.4163   4.0566
  0.0000   0.0000   0.1053   0.5794   1.1605   1.8782   2.6369   3.4349   4.2962   5.2236   6.0468   7.2312
 **** 1       11       12  ****
 10.4588  10.8898  11.7857  12.9247  13.9240  14.7788  15.6306  16.5551  17.5698  18.2231  18.8357  19.5765
  3.7924   3.7924   4.1265   4.1887   4.2391   4.3139   4.4364   4.4353   4.5339   4.3614   4.3192   3.9531
  0.0000   0.0000   0.0220   0.2791   0.8852   1.6313   2.3738   3.0750   3.6114   4.5079   5.4543   6.2709
 **** 1       12       12  ****
 10.4951  10.9261  11.7422  12.7568  13.7236  14.5930  15.5335  16.4916  17.4492  18.3327  19.2804  19.9458
  4.0194   4.0194   4.4039   4.8117   5.0623   5.5066   5.5836   5.6571   5.8054   5.7548   5.5640   5.4749
  0.0000   0.0000   0.2668   0.6518   1.2333   1.8162   2.4706   3.1127   3.7377   4.4681   5.0909   5.8795
LEFT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=30.000  MACH NUMBER= 0.100  ITERATION NUMBER= 8
   SIDESLIP ANGLE =      4.584 DEGREES
1

LEADING EDGE ELEMENTS     SURFACE #  1     STRIP # 11
*********************     ***********     *********
 **** 1        1       27  ****
 10.0253   2.0392   1.4881   1.3800   0.9490   1.8110   2.5038   3.2222   3.9405   4.6588   5.3772   6.0955   6.8138   7.5322
  8.2505   8.9688   9.6872  10.4055  11.3055  13.2055  14.6055  16.0055  17.4055  18.8055  20.2055  21.6055  23.0055
 -0.6022  -0.6022  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
 -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
  0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310   0.8310
 **** 1        2       25  ****
 10.0667   2.9415   2.0392   1.9378   1.5335   2.2986   3.0969   3.8759   4.6261   5.3319   6.0701   6.7777   7.5751   8.3676
  9.1263   9.8453  11.0035  12.0365  13.1088  14.2375  15.4494  16.7457  18.0259  19.2359  19.8497
 -0.9333  -0.9333  -0.6022  -0.6022  -0.6022  -0.8651  -0.8698  -1.0836  -1.3732  -1.6951  -1.7658  -1.5885  -1.4430  -1.4466
 -1.6292  -1.9570  -2.7206  -3.6644  -4.5255  -5.1986  -5.6996  -6.0035  -6.0215  -6.0289  -6.0051
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.4895   0.4310   0.5227   0.7592   1.0891   1.3431   1.3378   1.1833
  0.9876   0.8576   0.6400   0.6773   0.9274   1.4483   1.9831   2.4546   3.0326   3.7133   4.1956
 **** 1        3       22  ****
 10.1207   4.1204   2.9415   2.8511   2.4903   3.0770   3.7133   4.5837   5.4444   6.2276   6.9849   7.7940   8.6307   9.4569
 12.2948  13.7095  15.1027  16.4314  17.7185  18.9571  20.1137  21.2233
 -1.3659  -1.3659  -0.9333  -0.9333  -0.9333  -1.3570  -1.2025  -0.9588  -1.0564  -1.4958  -1.9564  -2.2439  -2.4956  -2.7675
 -2.4810  -2.6547  -2.9151  -3.3588  -3.8436  -4.3807  -4.9384  -5.5548
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4326   0.8959   0.9272   0.6708   0.5473   0.7294   0.9986   1.2209   1.4928
  2.1202   2.0854   2.1295   2.2963   2.6356   3.0856   3.6858   4.3722
 **** 1        4       20  ****
 10.1793   5.3965   4.1204   4.0443   3.7404   4.2130   4.7827   5.7103   6.6826   7.5575   8.3612   9.1322   9.8929  10.9163
 11.8198  12.8807  14.0409  15.2619  16.5301  17.7680
 -1.8341  -1.8341  -1.3659  -1.3659  -1.3659  -1.7509  -1.6759  -1.2907  -1.2321  -1.6626  -2.2898  -2.9661  -3.6082  -4.4265
 -4.8161  -4.7866  -4.6691  -4.5010  -4.3500  -4.1692
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9934   1.1394   0.8553   0.5748   0.5353   0.6284   0.8140   1.3790
  2.3973   3.3623   4.1957   4.9236   5.5685   6.1332
 **** 1        5       18  ****
 10.2333   6.5754   5.3965   5.3357   5.0936   5.4218   5.9484   6.9464   8.1247   9.2864  10.2067  11.3259  12.3604  13.2741
 14.2928  15.3521  16.4877  17.5161
 -2.2667  -2.2667  -1.8341  -1.8341  -1.8341  -2.1934  -2.3062  -2.0886  -1.8459  -2.0781  -2.8502  -3.6618  -4.5723  -5.3683
 -5.8908  -6.2418  -6.5596  -6.5546
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.0343   1.5357   1.5595   1.3404   1.2015   1.3993   1.6762   2.4392
  3.3130   4.1741   4.9325   6.2843
 **** 1        6       18  ****
 10.2747   7.4777   6.5754   6.5289   6.3437   6.5901   7.1632   7.8819   8.6734   9.5101  10.3757  11.5441  12.7323  13.8744
 14.9172  15.7989  16.7140  17.8861
 -2.5978  -2.5978  -2.2667  -2.2667  -2.2667  -2.5471  -2.6858  -2.6290  -2.3712  -1.9486  -1.9163  -2.6865  -3.3811  -4.0123
 -4.6510  -5.1985  -5.6133  -6.1602
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   0.9929   1.5826   2.0082   2.0484   1.7190   1.5511   1.8681   2.3648
  3.0388   3.9659   4.9315   5.7982
 **** 1        7       18  ****
 10.3000   8.0288   7.4777   7.4422   7.3005   7.4292   7.9926   8.5322   9.1445   9.7760  12.2357  13.6247  15.0109  16.3982
 17.7697  19.1067  20.4982  22.3107
 -2.8000  -2.8000  -2.5978  -2.5978  -2.5978  -2.8558  -3.0604  -3.0661  -2.9139  -2.6458  -2.4332  -2.2887  -2.2776  -2.28[illegible]
```

```
 -2.3703  -2.5977  -2.7108  -2.5856
  0.0000   0.0000   0.0000   0.0000   0.0000   0.4310   1.0048   1.5090   1.9360   2.2253   3.1636   3.3649   3.5503   3.7637
  4.0043   4.2481   4.4642   4.1068
**** 1      8      18 ****
 10.3412   8.3346   8.0288   8.0000   7.8850   8.0428   8.6464   9.1236   9.6340  10.1475  12.7754  14.0443  15.3854  16.7088
 18.0059  19.2645  20.4672  21.7766
 -3.0576  -3.0576  -2.8000  -2.8000  -2.8000  -3.0062  -3.3106  -3.4327  -3.4990  -3.5311  -2.9800  -3.2192  -3.3878  -3.6038
 -3.8869  -4.2086  -4.6038  -4.7135
  0.0000   0.0000   0.0000   0.0000   0.0000   0.3852   0.8483   1.2179   1.5799   1.9132   2.9179   3.3943   3.7908   4.2178
  4.6975   5.2451   5.8659   6.7917
**** 1      9      18 ****
 10.4000   8.7707   8.3346   8.3092   8.2076   8.3791   8.9516   9.2829   9.6301   9.9790  12.4737  13.7694  15.0930  16.4205
 17.7524  19.0670  20.3855  21.9672
 -3.4250  -3.4250  -3.0576  -3.0576  -3.0576  -3.2771  -3.7110  -3.8529  -3.8970  -3.3373  -3.3652  -3.2829  -3.2516  -3.2724
 -3.3591  -3.5180  -3.6967  -3.3919
  0.0000   0.0000   0.0000   0.0000   0.0000   0.3776   0.8502   1.2470   1.6715   2.0730   3.2974   3.7848   4.2004   4.6005
  4.9806   5.3804   5.7515   5.6625
**** 1      10     18 ****
 10.4588   9.2067   8.7707   8.7500   8.6675   9.0099   9.5913   9.8763  10.1656  10.4637  13.0994  14.3482  15.6599  16.9206
 18.1427  19.3614  20.5951  21.8081
 -3.7924  -3.7924  -3.4250  -3.4250  -3.4250  -3.5984  -3.9172  -4.0549  -4.1695  -4.2819  -4.1481  -4.2620  -4.3184  -4.5319
 -4.7605  -4.9716  -5.1647  -5.5706
  0.0000   0.0000   0.0000   0.0000   0.0000   0.2694   0.7266   0.9923   1.2669   1.5417   2.6782   3.3467   3.8928   4.4778
  5.1351   5.8055   6.4213   7.0877
**** 1      11     17 ****
 10.4951   9.4762   9.2067   9.1908   9.1274   9.2579   9.7221   9.9093  10.1053  12.0992  13.2052  14.3704  15.5690  16.8134
 18.0996  19.4172  21.0560
 -4.0194  -4.0194  -3.7924  -3.7924  -3.7924  -3.9872  -4.3149  -4.3898  -4.4469  -4.6523  -4.4873  -4.2889  -4.0600  -3.8611
 -3.7103  -3.5382  -2.8839
  0.0000   0.0000   0.0000   0.0000   0.0000   0.3776   0.9317   1.1746   1.4191   3.2619   4.0836   4.8063   5.4588   6.0312
  6.5223   6.9318   7.0469
1

WAKE ELEMENTS     SURFACE #  1     STRIP # 12
*************     ***********      *********
 **** 1      1      12 ****
 10.0000  10.4310  11.2930  12.4180  13.5430  14.6680  15.7930  16.9180  18.0430  19.1680  20.2930  21.4180
 -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000  -0.4000
  0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
 **** 1      2      12 ****
 10.0253  10.4563  11.2419  12.2988  13.3609  14.3975  15.4013  16.3477  17.2574  18.0738  18.7177  19.4791
 -0.6022  -0.6022  -0.7565  -1.0621  -1.4026  -1.8032  -2.2651  -2.7833  -3.3529  -4.0364  -4.6675  -4.9779
  0.0000   0.0000   0.3422   0.6400   0.8740   1.0938   1.3431   1.6768   2.0228   2.4180   3.1132   3.8782
 **** 1      3      12 ****
 10.0667  10.4977  11.3207  12.3759  13.4212  14.4801  15.5173  16.5782  17.6100  18.4898  19.3226  20.1929
 -0.9333  -0.9333  -1.1796  -1.5435  -1.9270  -2.3561  -2.8038  -3.2770  -3.7677  -4.2915  -4.8199  -5.2877
  0.0000   0.0000   0.0951   0.2437   0.4117   0.6265   0.9006   1.2690   1.6924   2.1810   2.7416   3.2807
 **** 1      4      12 ****
 10.1207  10.5517  11.3297  12.2913  13.2073  14.1058  14.9921  15.8438  16.7022  17.5916  18.5119  19.5992
 -1.3659  -1.3659  -1.7422  -2.3032  -2.8993  -3.4981  -4.0549  -4.5190  -4.9414  -5.2986  -5.5611  -5.6054
  0.0000   0.0000   0.0759   0.2653   0.5445   0.9166   1.3690   1.9322   2.5185   3.1278   3.7350   4.3594
 **** 1      5      12 ****
 10.1793  10.6103  11.3327  12.2021  13.0411  13.8115  14.5985  15.2472  15.9265  16.6609  17.3911  18.2568
 -1.8341  -1.8341  -2.3462  -3.0387  -3.7292  -4.4454  -5.1290  -5.8333  -6.1230  -6.1772  -6.1240  -6.3578
  0.0000   0.0000   0.0765   0.2895   0.6009   1.0136   1.4013   1.9604   2.8152   3.6675   4.5219   4.9230
 **** 1      6      12 ****
 10.2333  10.6643  11.3554  12.0707  12.6572  13.3996  14.2203  15.0512  15.9289  16.8977  17.8973  18.6748
 -2.2667  -2.2667  -2.8570  -3.7350  -4.5827  -5.2605  -5.8048  -6.2661  -6.6965  -7.0090  -7.2999  -7.2792
  0.0000   0.0000   0.0690   0.2808   0.7947   1.3207   1.8882   2.5003   3.0641   3.5490   3.9112   4.4439
 **** 1      7      12 ****
 10.2747  10.7057  11.3202  12.0764  12.8456  13.6397  14.4824  15.2623  15.9763  16.7450  17.5770  18.1932
 -2.5978  -2.5978  -3.2039  -4.0390  -4.6739  -5.1222  -5.4403  -5.8973  -6.3887  -6.8240  -7.1455  -7.4439
  0.0000   0.0000   0.0576   0.1780   0.7116   1.4177   2.1525   2.8173   3.5494   4.2782   4.9958   5.7958
 **** 1      8      12 ****
 10.3000  10.7310  11.5232  12.4568  13.4870  14.3774  15.1624  16.1086  16.8302  17.5803  18.3685  19.1907
 -2.8000  -2.8000  -3.1230  -3.7726  -4.3423  -4.7955  -5.3333  -5.7591  -6.3041  -6.4710  -6.4725  -6.6426
  0.0000   0.0000  -0.1050   0.3084   0.5240   1.1033   1.7536   2.1105   2.7794   3.6033   4.3710   4.8395
 **** 1      9      12 ****
 10.3412  10.7722  11.4689  12.3691  13.1646  13.9480  14.7925  15.6739  16.5348  17.4061  18.2828  19.0423
 -3.0576  -3.0576  -3.5823  -4.2427  -4.8745  -5.4687  -5.8515  -6.0333  -6.2419  -6.5952  -6.8919  -6.9353
  0.0000   0.0000  -0.1106   0.1231   0.6573   1.2179   1.8640   2.5587   3.2762   3.9357   4.6184   5.4301
 **** 1      10     12 ****
 10.4000  10.8310  11.4364  12.2126  13.0951  13.9796  14.8637  15.6816  16.4575  17.3063  18.1778  19.0143
 -3.4250  -3.4250  -4.0833  -4.8800  -5.4838  -5,9798  -6,3800  -6.6425  -6.8586  -7.0544  -7.2370  -7.3374
  0.0000   0.0000   0.0357   0.3677   0.8211   1.4336   2.1140   2.8369   3.6217   4.3308   5.0154   5.6672
 **** 1      11     12 ****
 10.4588  10.8898  11.5567  12.3212  13.1590  14.0263  14.9008  15.8137  16.7191  17.5727  18.4415  19.3845
 -3.7924  -3.7924  -4.4484  -5.2113  -5.9337  -6.3294  -6.6840  -6.8686  -6.9283  -7.0266  -7.1263  -7.1078
  0.0000   0.0000  -0.0205   0.4056   0.9430   1.5348   2.2105   2.9231   3.6674   4.4180   5.1515   5.6021
 **** 1      12     12 ****
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10.4951	10.9261	11.5514	12.2855	13.0498	13.8489	14.6950	15.6136	16.5770	17.5088	18.4105	19.3076
-4.0194	-4.0194	-4.6493	-5.3451	-5.9067	-6.3889	-6.7225	-6.9909	-7.2553	-7.4884	-7.6885	-7.9027
0.0000	0.0000	0.2295	0.7235	1.3287	1.9552	2.6196	3.2124	3.7320	4.3297	4.9840	5.5396

```
RIGHT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=35.000  MACH NUMBER= 0.100  ITERATION NUMBER= 1
    SIDESLIP ANGLE =       5.000 DEGREES
1

LEADING EDGE ELEMENTS      SURFACE # 1      STRIP # 10
*********************      ***********      *********
 **** 1       1      32  ****
   9.2346   5.7724   5.3001   5.2500   5.0500   5.4500   5.6957   5.9624   6.2291   6.4957   6.7624   7.0291   7.2957   7.5624
   7.8291   8.0957   8.3624   8.6291   8.8957   9.1624   9.4291  10.4791  11.5291  12.5791  13.6291  14.6791  15.7291  16.7791
  17.8291  18.8791  19.9291  20.9791
   0.7253   0.7253   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
   0.5000   0.5000   0.5000   0.5000
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
   0.2815   0.2815   0.2815   0.2815
 **** 1       2      29  ****
   9.2154   6.3579   5.7724   5.7284   5.5531   5.8679   6.1401   6.4262   6.7180   6.9998   7.2624   7.4958   7.6962   7.8866
   8.0758   8.2736   8.4468   8.6155   9.2719  10.0162  10.7236  11.4133  12.0796  12.7301  13.3761  14.0275  14.6923  15.3767
  16.0837
   1.0047   1.0047   0.7253   0.7253   0.7253   0.8179   0.7941   0.7688   0.7690   0.8209   0.9318   1.1014   1.3133   1.5348
   1.7574   1.9724   2.2077   2.4463   3.2658   3.9925   4.3112   4.5616   4.7173   4.7754   4.7413   4.6271   4.4486   4.2229
   3.9684
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1406   0.2645   0.3179   0.3034   0.2461   0.1818   0.1358   0.1187   0.1094
   0.1094   0.1094   0.1094   0.1094   0.1094   0.2525   0.9600   1.7110   2.5075   3.3297   4.1567   4.9723   5.7652   6.5288
   7.2622
 **** 1       3      27  ****
   9.2000   6.8301   6.3579   6.3216   6.1769   6.4514   6.6946   6.9607   7.2407   7.5275   7.8151   8.0922   8.3461   8.5733
   8.7950   9.0069   9.7527  10.6906  11.5441  12.4960  13.4242  14.3022  15.1513  15.9780  16.7872  17.5826  18.3676
   1.2300   1.2300   1.0047   1.0047   1.0047   1.0834   1.0968   1.1059   1.1003   1.0835   1.0528   1.0279   1.0733   1.1971
   1.3763   1.5734   2.3125   2.7845   3.3961   3.8392   4.2184   4.5953   4.9215   5.1988   5.4326   5.6281   5.7872
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1142   0.2893   0.4028   0.4754   0.5099   0.4995   0.4197   0.2886   0.1588
   0.1094   0.1094   0.1094   0.1094   0.1094   0.1094   0.4213   0.8566   1.3812   1.9661   2.5930   3.2501   3.9290
 **** 1       4      24  ****
   9.1664   6.9933   6.8301   6.8000   6.6800   6.8945   7.1361   7.4187   7.6986   7.9399   8.2015   8.4683   8.7237   9.5324
  10.3653  11.1278  11.8704  12.6135  13.3679  14.1332  14.9080  15.6954  16.4975  17.3164
   1.5078   1.5078   1.2300   1.2300   1.2300   1.3376   1.4411   1.6023   1.8002   2.0436   2.2647   2.4783   2.7054   3.3527
   3.7710   3.9661   4.0328   4.0090   3.9066   3.7516   3.5475   3.3057   3.0359   2.7476
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2542   0.3622   0.3585   0.3702   0.3846   0.3571   0.3298   0.5016
   0.9852   1.6802   2.4195   3.1609   3.8840   4.5860   5.2647   5.9159   6.5374   7.1280
 **** 1       5      23  ****
   9.1246   7.1957   6.9933   6.9657   6.8557   7.0442   7.2272   7.4553   7.7889   8.1496   8.5135   8.8711   9.2251  10.2092
  11.1264  12.0492  12.9715  13.8768  14.7745  15.6532  16.5142  17.3620  18.1998
   1.8522   1.8522   1.5078   1.5078   1.5078   1.6213   1.7387   1.8926   1.7953   1.7341   1.7689   1.8460   1.9408   2.2875
   2.7032   3.0094   3.2037   3.3594   3.4857   3.5936   3.6574   3.6802   3.6626
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3161   0.5587   0.6761   0.6513   0.6205   0.5943   0.5799   0.6979
   0.9951   1.3917   1.8544   2.3630   2.8928   3.4573   4.0549   4.6740   5.3066
 **** 1       6      22  ****
   9.0910   7.3590   7.1957   7.1713   7.0736   7.2443   7.4413   7.7840   8.2463   8.6471   9.0122   9.8273  10.6370  11.4424
  12.2267  13.0257  13.8534  14.7120  15.5973  16.4984  17.4066  18.3319
   2.1300   2.1300   1.8522   1.8522   1.8522   1.9472   2.0847   2.4038   2.5455   2.8236   3.0902   3.3870   3.5023   3.5305
   3.3825   3.1340   2.8301   2.5158   2.2121   1.9248   1.6288   1.3115
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2891   0.4276   0.4959   0.5198   0.7043   1.2960   1.9544   2.6275
   3.3098   3.9441   4.5142   5.0305   5.5064   5.9625   6.3983   6.7801
 **** 1       7      22  ****
   9.0516   7.5504   7.3590   7.3370   7.2493   7.3990   7.5593   7.6821   7.9634   8.3176   8.7202   9.7422  10.7668  11.8093
  12.8572  13.8938  14.9239  15.9418  16.9436  17.9333  18.9277  19.9237
   2.4556   2.4556   2.1300   2.1300   2.1300   2.2215   2.3715   2.7921   2.6792   2.5377   2.3831   2.1806   2.0061   1.8811
   1.9459   2.1007   2.2924   2.5084   2.7740   3.0291   3.2396   3.4479
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3138   0.3316   0.6485   0.8649   0.9439   1.0743   1.2235   1.2327
   1.2183   1.2817   1.3500   1.4908   1.6588   1.8997   2.1631   2.4220
 **** 1       8      22  ****
   8.9955   7.8234   7.5504   7.5314   7.4553   7.5868   7.7596   8.0833   8.3335   8.5649   8.7966   9.1586   9.9976  10.9065
  11.8783  12.8763  13.8782  14.8810  15.8875  16.8945  17.9003  18.9008
   2.9200   2.9200   2.4556   2.4556   2.4556   2.5320   2.6619   2.8560   3.1095   3.3070   3.4109   3.5128   3.2527   2.9295
   2.6476   2.4648   2.3311   2.2357   2.1808   2.1718   2.2025   2.2736
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3175   0.2736   0.4065   0.6343   0.9171   1.8974   2.4727   2.8874
   3.1678   3.4379   3.7224   4.0185   4.3126   4.6099   4.9098   5.2203
 **** 1       9      21  ****
   8.9394   8.0963   7.8234   7.8085   7.7491   7.8581   8.0650   8.2341   8.4696   8.7159   9.7004  10.5613  11.4954  12.4832
  13.5001  14.5299  15.5661  16.6001  17.6265  18.6378  19.6348
   3.3844   3.3844   2.9200   2.9200   2.9200   2.9671   3.0420   3.0696   2.9665   2.9349   2.5759   2.5561   2.3850   2.2119
   2.0895   2.0266   2.0200   2.0778   2.2026   2.3807   2.5806
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3134   0.5557   0.7160   0.8732   0.9396   1.5403   1.9883   2.2994
   2.5309   2.7260   2.8956   3.0687   3.2515   3.4706   3.7324
 **** 1      10      21  ****
   8.9047   8.2650   8.0963   8.0856   8.0430   8.1247   8.3369   8.4746   8.6014   8.7037   9.1621   9.8029  10.4980  11.2792
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  12.1144  13.0031  13.9403  14.9232  15.9423  16.9731  17.9926
   3.6713   3.6713   3.3844   3.3844   3.3844   3.4090   3.4462   3.4739   3 4925   3.5016   3.8003   3.7334   3.4441   3.0885
   2.6758   2.2714   1.9009   1.6069   1.4313   1.3849   1.4122
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3182   0.4789   0.6496   0.8366   1.7328   2.5619   3.7938   3.8986
   4.3831   4.7692   5.0640   5.2875   5.4697   5.6638   5.9136
1

WAKE ELEMENTS     SURFACE # 1     STRIP # 11
*************     ***********     *********
 **** 1       1      11 ****
   9.2500   9.4500   9.8500  11.2250  12.6000  13.9750  15.3500  16.7250  18.1000  19.4750  20.8500
   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200
 **** 1       2      11 ****
   9.2346   9.4346   9.7558  10.9957  12.1622  13.4433  14.7504  16.0302  17.3887  18.5767  19.8377
   0.7253   0.7253   0.6805   0.8467   1.3554   1.8132   2.2331   2.5787   2.7913   2.8190   2.9659
  -0.1200  -0.1200   0.1141   0.6847   1.2054   1.4051   1.4811   1.1161   1.1196   1.8113   2.3395
 **** 1       3      11 ****
   9.2154   9.4154   9.7894  11.0843  12.2781  13.6339  14.9654  16.2558  17.4357  18.5621  19.8525
   1.0047   1.0047   1.0076   1.2701   1.9449   2.1651   2.3078   2.3771   2.5772   2.9577   3.3121
  -0.1200  -0.1200   0.0219   0.4028   0.3024   0.3649   0.6766   1.1464   1.8235   2.5142   2.8303
 **** 1       4      11 ****
   9.2000   9.4000   9.7946  11.1090  12.4463  13.7521  15.0001  16.1753  17.4005  18.2622  19.4264
   1.2300   1.2300   1.2498   1.2262   1.3171   1.6177   1.9836   2.4849   3.0706   2.0573   2.3727
  -0.1200  -0.1200  -0.1827   0.2203   0.5266   0.9352   1.2816   1.7900   2.0046   2.3530   3.0132
 **** 1       5      11 ****
   9.1664   9.3664   9.6677  11.0394  12.3658  13.7281  15.0400  16.3594  17.7059  18.9977  20.2214
   1.5078   1.5078   1.6421   1.7296   1.4266   1.4527   1.1023   0.9098   0.9437   1.1137   1.2538
  -0.1200  -0.1200  -0.3462  -0.3101  -0.5088  -0.3241  -0.1078   0.2280   0.5044   0.9436   1.5548
 **** 1       6      11 ****
   9.1246   9.3246   9.4448  10.6157  11.8828  13.1668  14.4426  15.6961  16.9285  18.1294  19.3035
   1.8522   1.8522   2.1399   2.7407   3.1537   3.5273   3.8339   4.0915   4.3264   4.5623   4.7919
  -0.1200  -0.1200  -0.3705  -0.7689  -0.4305  -0.1106   0.3005   0.8036   1.3662   1.9931   2.6708
 **** 1       7      11 ****
   9.0910   9.2910   9.2933   9.7726  10.7643  11.6779  12.5607  13.4476  14.3469  15.2579  16.1844
   2.1300   2.1300   2.5296   3.8006   4.5762   5.0356   5.3578   5.5875   5.7191   5.7775   5.7826
  -0.1200  -0.1200  -0.1534   0.0537   0.6064   1.5257   2.5294   3.5547   4.5865   5.6147   6.6307
 **** 1       8      11 ****
   9.0516   9.2516   9.3746  10.3419  11.5605  12.5507  13.8425  15.1814  16.4403  17.5388  18.5676
   2.4556   2.4556   2.7738   3.0710   3.2827   3.2475   3.2242   3.1250   3.5510   4.1097   4.5526
  -0.1200  -0.1200   0.0890   1.0199   1.6206   2.5739   3.0446   3.3413   3.6939   4.3036   5.1011
 **** 1       9      11 ****
   8.9955   9.1955   9.3917  10.0794  10.8755  11.3665  11.8459  12.7704  13.9546  15.1295  16.3626
   2.9200   2.9200   3.2087   4.2033   4.8415   4.8041   4.1866   3.4281   2.9332   3.0153   3.3388
  -0.1200  -0.1200  -0.3153   0.3393   1.2610   2.5448   3.6759   4.3547   4.8480   5.5577   6.0727
 **** 1      10      11 ****
   8.9394   9.1394   9.1698   9.6914  10.5320  11.8672  13.1580  14.4681  15.7278  16.8961  17.9490
   3.3844   3.3844   3.7694   3.8333   2.9721   2.9666   2.7799   2.8414   3.0219   3.4142   3.9790
  -0.1200  -0.1200  -0.0160   1.2546   1.9197   2.2481   2.6833   3.0965   3.6172   4.2268   4.9074
 **** 1      11      11 ****
   8.9047   9.1047   9.2042  10.1162  11.0518  11.8576  12.5052  12.9031  13.6196  14.3851  15.2069
   3.6713   3.6713   3.8700   4.8989   5.0024   4.8430   5.3017   5.4831   5.2709   4.9482   4.5756
  -0.1200  -0.1200   0.2126   0.2301   1.2324   2.3351   3.4580   4.7616   5.9157   7.0115   8.0490
LEFT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=35.000  MACH NUMBER= 0.100  ITERATION NUMBER= 1
    SIDESLIP ANGLE =       5.000 DEGREES
1

LEADING EDGE ELEMENTS     SURFACE # 1     STRIP # 10
*********************     ***********     *********
 **** 1       1      32 ****
   9.2346   5.7724   5.3001   5.2500   5.0500   5.4500   5.6957   5.9624   6.2291   6.4957   6.7624   7.0291   7.2957   7.5624
   7.8291   8.0957   8.3624   8.6291   8.8957   9.1624   9.4291  10.4791  11.5291  12.5791  13.6291  14.6791  15.7291  16.7791
  17.8291  18.8791  19.9291  20.9791
  -0.7253  -0.7253  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000
  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000
  -0.5000  -0.5000  -0.5000  -0.5000
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
   0.2815   0.2815   0.2815   0.2815
 **** 1       2      29 ****
   9.2154   5.3579   5.7724   5.7284   5.5531   5.8682   6.1439   6.4323   6.7227   6.9978   7.2479   7.4596   7.6444   7.8271
   8.0393   8.2048   8.3804   8.5625   9.1804   9.9444  10.6562  11.3810  12.1125  12.8483  13.5915  14.3466  15.1187  15.9132
  16.7329
  -1.0047  -1.0047  -0.7253  -0.7253  -0.7253  -0.8251  -0.8229  -0.8074  -0.8270  -0.9006  -1.0376  -1.2357  -1.4619  -1.6899
  -1.8909  -2.1316  -2.3651  -2.5936  -3.4426  -4.1402  -4.5605  -4.8665  -5.0832  -5.2303  -5.3178  -5.3523  -5.3390  -5.2851
  -5.2043
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1376   0.2558   0.3001   0.2751   0.2097   0.1461   0.1094   0.1094   0.1094
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 0.1094   0.1094   0.1094   0.1094   0.1094   0.2886   0.9361   1.6314   2.3529   3.0874   3.8239   4.5527   5.2641   5.9485
 6.5997
**** 1        3       27  ****
 9.2000   6.8301   6.3579   6.3216   6.1769   6.4517   6.6903   6.9559   7.2384   7.5273   7.8138   8.0784   8.3040   8.5306
 8.7458   8.9645   9.7067  10.7194  11.5116  12.4046  13.2409  14.0553  14.8584  15.6543  16.4463  17.2368  18.0279
-1.2300  -1.2300  -1.0047  -1.0047  -1.0047  -1.0927  -1.1262  -1.1421  -1.1447  -1.1420  -1.1347  -1.1473  -1.2409  -1.4102
-1.6037  -1.7932  -2.5359  -2.8132  -3.5023  -4.0547  -4.6374  -5.1551  -5.6033  -5.9929  -6.3331  -6.6313  -6.8917
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1105   0.2891   0.4029   0.4660   0.4822   0.4421   0.3256   0.1704   0.1094
 0.1094   0.1094   0.1094   0.1094   0.1094   0.1094   0.3617   0.7754   1.2820   1.8452   2.4448   3.0683   3.7076
**** 1        4       24  ****
 9.1664   6.9933   6.8301   6.8000   6.6800   6.8917   7.1223   7.4019   7.6420   7.8720   8.1152   8.3295   8.5418   9.2148
 9.9555  10.7006  11.4720  12.2724  13.1085  13.9743  14.8646  15.7778  16.7140  17.6753
-1.5078  -1.5078  -1.2300  -1.2300  -1.2300  -1.3431  -1.4675  -1.6616  -1.9063  -2.1600  -2.3994  -2.6569  -2.9235  -3.6699
-4.0660  -4.2896  -4.3803  -4.3937  -4.3456  -4.2648  -4.1539  -4.0135  -3.8432  -3.6512
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2555   0.2968   0.2998   0.3179   0.2857   0.2124   0.2498   0.5538
 1.1838   1.8891   2.5956   3.2750   3.9083   4.4969   5.0424   5.5413   5.9852   6.3614
**** 1        5       23  ****
 9.1246   7.1957   6.9933   6.9657   6.8557   7.0412   7.2085   7.4505   7.8090   8.1737   8.5300   8.8811   9.2273  10.1868
11.0546  11.8757  12.6915  13.5035  14.3452  15.2094  16.0888  16.9801  17.8798
-1.8522  -1.8522  -1.5078  -1.5078  -1.5078  -1.6263  -1.7677  -1.8288  -1.7608  -1.7896  -1.8711  -1.9701  -2.0880  -2.5035
-3.0777  -3.6101  -3.9613  -4.2146  -4.3710  -4.4830  -4.5544  -4.5932  -4.6033
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3144   0.5831   0.6204   0.5950   0.5636   0.5262   0.4976   0.5935
 0.7335   1.1141   1.6742   2.2898   2.8977   3.4835   4.0527   4.6064   5.1477
**** 1        6       22  ****
 9.0910   7.3590   7.1957   7.1713   7.0736   7.2406   7.4246   7.7778   8.2235   8.6889   9.0278  10.0628  11.0571  12.0615
13.0869  14.1039  15.1148  16.1019  17.0810  18.0472  19.0084  19.9701
-2.1300  -2.1300  -1.8522  -1.8522  -1.8522  -1.9535  -2.1139  -2.4188  -2.5982  -2.5290  -2.5579  -2.6698  -2.7765  -2.8473
-2.9555  -3.1333  -3.3301  -3.5631  -3.7945  -4.0155  -4.1966  -4.3340
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2839   0.4279   0.5153   0.3846   0.7350   0.8716   1.1920   1.4898
 1.6881   1.8793   2.0840   2.3558   2.6563   3.0028   3.3847   3.7831
**** 1        7       22  ****
 9.0516   7.5504   7.3590   7.3370   7.2493   7.3945   7.5400   7.6760   8.0938   8.3874   8.8123   9.6338  10.5402  11.4643
12.4306  13.4381  14.4708  15.5156  16.5654  17.6144  18.6601  19.7010
-2.4556  -2.4556  -2.1300  -2.1300  -2.1300  -2.2285  -2.4038  -2.8140  -2.6982  -2.8963  -2.9309  -3.0844  -3.1267  -3.0207
-2.8449  -2.6719  -2.5308  -2.4445  -2.4237  -2.4691  -2.5638  -2.7008
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3046   0.3789   0.4451   0.7037   0.8064   1.4419   1.9703   2.4576
 2.8287   3.0689   3.1956   3.2533   3.2593   3.2591   3.2644   3.2844
**** 1        8       22  ****
 8.9955   7.8234   7.5504   7.5314   7.4553   7.5817   7.7420   8.0091   8.2630   8.4898   8.7441   9.3996  10.1530  10.9754
11.8446  12.7518  13.6910  14.6579  15.6513  16.6657  17.6963  18.7372
-2.9200  -2.9200  -2.4556  -2.4556  -2.4556  -2.5402  -2.6951  -2.9654  -3.2044  -3.3940  -3.4975  -3.7790  -3.8204  -3.7498
-3.6356  -3.5069  -3.3678  -3.2226  -3.0651  -2.9033  -2.7490  -2.6185
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3102   0.3026   0.4538   0.6926   0.9555   1.7259   2.4561   3.1050
 3.6829   4.1958   4.6440   5.0270   5.3284   5.5458   5.6744   5.7191
**** 1        9       21  ****
 8.9394   8.0963   7.8234   7.8085   7.7491   7.8529   8.0512   8.1974   8.4554   8.6529   9.3700  10.2044  11.2360  12.2826
13.3315  14.3745  15.4036  16.4209  17.4250  18.4237  19.4297
-3.3844  -3.3844  -2.9200  -2.9200  -2.9200  -2.9777  -3.0808  -3.1420  -3.0293  -3.1166  -3.1127  -2.6129  -2.4380  -2.3566
-2.3380  -2.4136  -2.5884  -2.8467  -3.1535  -3.4658  -3.7467
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3095   0.5604   0.6542   0.8577   1.6247   2.0202   2.1079   2.1296
 2.0845   1.9903   1.8766   1.8471   1.8616   1.9486   2.0564
**** 1       10       21  ****
 8.9047   8.2650   8.0963   8.0856   8.0430   8.1196   8.3257   8.4602   8.3860   8.6884   9.2082   9.8065  10.4719  11.2163
12.0355  12.9179  13.8501  14.8210  15.8194  16.8331  17.8503
-3.6713  -3.6713  -3.3844  -3.3844  -3.3844  -3.4220  -3.4943  -3.5477  -3.5833  -3.6327  -4.0198  -4.1362  -4.0654  -3.8645
-3.6052  -3.3336  -3.0665  -2.8055  -2.5389  -2.2721  -2.0210
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3150   0.4719   0.6406   0.8212   1.6474   2.5024   3.3115   4.0243
 4.6277   5.1278   5.5306   5.8336   6.0192   6.0802   6.0102
:

WAKE ELEMENTS     SURFACE # 1     STRIP # 11
*************     ***********     *********
**** 1        1       11  ****
 9.2500   9.4500   9.8500  11.2250  12.6000  13.9750  15.3500  16.7250  18.1000  19.4750  20.8500
-0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000  -0.5000
-0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200
**** 1        2       11  ****
 9.2346   9.4346   9.7524  10.9773  12.1587  13.4052  14.6294  15.6802  16.7797  17.8526  18.8837
-0.7253  -0.7253  -0.6945  -0.8790  -1.3328  -1.8232  -2.4189  -3.2996  -3.9941  -4.6292  -5.1802
-0.1200  -0.1200   0.1209   0.7178   1.2554   1.5659   1.7583   1.6543   2.1008   2.6806   3.4043
**** 1        3       11  ****
 9.2154   9.4154   9.7842  11.0483  12.1894  13.5188  14.8379  16.1261  17.3774  18.5815  19.9331
-1.0047  -1.0047  -1.0275  -1.3580  -2.1225  -2.4720  -2.7144  -2.9335  -3.1961  -3.5831  -3.3352
-0.1200  -0.1200   0.0333   0.4617   0.3983   0.3672   0.6705   1.0986   1.6044   2.1437   2.1931
**** 1        4       11  ****
 9.2000   9.4000   9.7967  11.0878  12.4199  13.7216  14.9927  16.2021  17.3630  18.4560  19.6512
-1.2300  -1.2300  -1.2614  -1.3353  -1.4985  -1.8275  -2.2115  -2.6825  -3.3384  -3.5903  -4.1065
-0.1200  -0.1200  -0.1604   0.3068   0.6060   0.9028   1.2595   1.7137   2.0495   2.8448   3.2869
**** 1        5       11  ****
 9.1664   9.3664   9.6873  11.0457  12.3994  13.7159  15.0348  16.3433  17.6153  18.8700  20.1337
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```
 -1.5078  -1.5078  -1.6387  -1.8271  -1.5913  -1.3243  -1.1928  -1.2010  -1.2836  -1.3626  -1.4418
 -0.1200  -0.1200  -0.3196  -0.2203  -0.2713   0.0222   0.3881   0.8103   1.3260   1.8828   2.4191
 **** 1       6      11 ****
  9.1246   9.3246   9.5158  10.7107  11.9258  13.1618  14.4054  15.6401  16.8571  18.0566  19.2345
 -1.8522  -1.8522  -2.0897  -2.6452  -3.1969  -3.7031  -4.1341  -4.5118  -4.8615  -5.1872  -5.5074
 -0.1200  -0.1200  -0.3790  -0.7717  -0.4405  -0.1138   0.2842   0.7567   1.2927   1.8807   2.5137
 **** 1       7      11 ****
  9.0910   9.2910   9.3256   9.8871  10.8701  11.7371  12.6695  13.6694  14.6761  15.6893  16.7072
 -2.1300  -2.1300  -2.4708  -3.6842  -4.3971  -4.9661  -5.3135  -5.6270  -5.8784  -6.1052  -6.3095
 -0.1200  -0.1200  -0.3265  -0.6477  -0.0027   0.9003   1.8492   2.7394   3.6417   4.5431   5.4447
 **** 1       8      11 ****
  9.0516   9.2516   9.2934   9.6013  10.1887  10.8712  11.1388  12.0438  12.9673  13.7894  14.9607
 -2.4556  -2.4556  -2.8532  -4.1772  -5.2822  -5.6839  -4.6257  -4.9047  -4.5673  -4.0009  -3.4890
 -0.1200  -0.1200  -0.1341   0.0728   0.6427   1.7667   2.6028   3.5997   4.5609   5.5064   6.0131
 **** 1       9      11 ****
  8.9955   9.1955   9.3282   9.6348   9.8164  10.7623  11.5068  12.2766  13.1383  14.1375  15.2771
 -2.9200  -2.9200  -3.2019  -4.3078  -5.6098  -5.6899  -5.7904  -5.6810  -5.3485  -4.8822  -4.4186
 -0.1200  -0.1200  -0.3708   0.3865   0.7897   1.7845   2.9361   4.0701   5.0887   5.9102   6.5242
 **** 1      10      11 ****
  8.9394   9.1394   9.1739   9.8018  10.2339  10.5917  11.4492  12.3822  13.4221  14.5328  15.6983
 -3.3844  -3.3844  -3.7668  -4.8073  -5.3435  -5.2350  -5.0602  -4.8395  -4.5320  -4.1441  -3.8357
 -0.1200  -0.1200  -0.2320   0.4112   1.6014   2.9246   3.9851   4.9707   5.8161   6.5278   7.1890
 **** 1      11      11 ****
  8.9047   9.1047   9.1131   9.2394   9.7526  10.5285  11.4917  12.5345  13.6704  14.8801  16.1847
 -3.6713  -3.6713  -4.0178  -4.9479  -5.0299  -4.8085  -4.4643  -4.0687  -3.6851  -3.3858  -3.1916
 -0.1200  -0.1200   0.0799   1.0843   2.3573   3.4706   4.3895   5.1938   5.8670   6.4481   6.8366
ILMAX,ILFOR,ILAFT          45           35           11
(X, Y AND Z-COORDINATES)
    THE RIGHT-SIDE FOREBODY VORTEX LOCATIONS
     3.50000     4.63514     5.79228     6.99738     8.24210     9.51193    10.79648    12.08962
    13.38696    14.68547    15.98249
    -0.06606    -0.17091    -0.25524    -0.32113    -0.37423    -0.41676    -0.45075    -0.47989
    -0.50296    -0.50694    -0.47509
     0.91151     1.53639     2.12282     2.60593     2.97720     3.25240     3.44932     3.57948
     3.65933     3.72145     3.80341
    THE LEFT-SIDE FOREBODY VORTEX LOCATIONS
     3.50000     4.60878     5.74666     6.92199     8.12855     9.35648    10.59913    11.85362
    13.11888    14.39451    15.67866
    -0.63641    -0.69925    -0.74871    -0.78067    -0.80183    -0.81793    -0.83414    -0.85389
    -0.88023    -0.92716    -1.00853
     1.34985     2.02562     2.65234     3.20694     3.69043     4.11697     4.49849     4.83888
     5.13622     5.38234     5.56765
RIGHT WING FREE ELEMENT SHAPES
1

ALPHA(DEG.)=35.000  MACH NUMBER= 0.100  ITERATION NUMBER= 8
    SIDESLIP ANGLE =      5.000 DEGREES
1

LEADING EDGE ELEMENTS      SURFACE # 1      STRIP # 10
*********************      ***********      *********
 **** 1       1      42 ****
  9.2346   5.7724   5.3001   5.2500   5.0500   5.4500   5.6957   5.9624   6.2291   6.4957   6.7624   7.0291   7.2957   7.5624
  7.8291   8.0957   8.3624   8.6291   8.8957   9.1624   9.4291   9.9541  10.4791  11.0041  11.5291  12.0541  12.5791  13.1041
 13.6291  14.1541  14.6791  15.2041  15.7291  16.2541  16.7791  17.3041  17.8291  18.3541  18.8791  19.4041  19.9291  20.4541
  0.7253   0.7253   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
  0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
  0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
 -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
  0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
  0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815   0.2815
 **** 1       2      38 ****
  9.2154   6.3579   5.7724   5.7284   5.5531   5.8632   6.1300   6.4137   6.7059   6.9907   7.2548   7.5029   7.7528   7.9865
  8.1907   8.3936   8.6082   8.8389   9.7347  10.1950  10.6573  11.1173  11.6215  12.1383  12.6326  13.1412  13.6568  14.1688
 14.6720  15.1624  15.6383  16.1004  16.5493  16.9832  17.4031  17.8135  18.2009  18.6197
  1.0047   1.0047   0.7253   0.7253   0.7253   0.8889   0.8406   0.8085   0.8124   0.8686   0.9929   1.1430   1.2872   1.4578
  1.6461   1.7943   1.8917   1.9462   2.1328   2.0859   2.0100   1.8829   1.7786   1.7679   1.7531   1.6898   1.6724   1.6960
  1.7509   1.8296   1.9245   2.0293   2.1320   2.2314   2.3222   2.3850   2.4620   2.5606
 -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2379   0.2999   0.3016   0.2686   0.2553   0.2906   0.3369   0.3773
  0.4679   0.6171   0.7898   0.9606   1.4756   1.7237   1.9607   2.1794   2.2822   2.3740   2.5502   2.6642   2.7612   2.8748
  3.0143   3.1845   3.3847   3.6108   3.8629   4.1413   4.4430   4.7641   5.1103   5.4111
 **** 1       3      36 ****
  9.2000   6.8301   6.3579   6.3216   6.1769   6.4066   6.6310   6.8690   7.1240   7.3942   7.6683   7.9366   8.1912   8.4208
  8.6092   8.7533   9.0685   9.3562   9.7118  10.0700  10.4255  10.7847  11.1479  11.5418  11.9366  12.3363  12.7435  13.1589
 13.5820  14.0127  14.4509  14.8967  15.3502  15.8116  16.2808  16.7580
  1.2300   1.2300   1.0047   1.0047   1.0047   1.1807   1.1750   1.1209   1.0216   0.9181   0.8723   0.9029   1.0040   1.1663
  1.3810   1.6310   2.5271   2.7697   2.9218   3.0388   3.1194   3.1777   3.2175   3.1495   3.0333   2.8944   2.7402   2.5747
  2.4022   2.2264   2.0483   1.8704   1.6956   1.5269   1.3666   1.2176
 -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3085   0.4639   0.5582   0.5576   0.4767   0.3727   0.2796   0.2111
  0.1644   0.1432   0.5908   0.9568   1.3119   1.6773   2.0552   2.4336   2.8106   3.1509   3.4769   3.7877   4.0810   4.3561
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   4.6146   4.8580   5.0858   5.2984   5.4971   5.6822   5.8548   6.0151
  **** 1       4      33  ****
   9.1664   6.9933   6.8301   6.8000   6.6800   6.8475   7.1029   7.4009   7.6410   7.9113   8.2145   8.5473   8.8864   9.8236
  10.2143  10.5601  10.8715  11.1821  11.4722  11.8338  12.2021  12.5816  13.0051  13.4732  13.9797  14.4481  14.8558  15.2354
  15.6027  15.9392  16.2301  16.5049  16.8639
   1.5078   1.5078   1.2300   1.2300   1.2300   1.4018   1.4873   1.6276   1.7542   1.7322   1.6381   1.5583   1.5609   2.0034
   2.3439   2.6952   3.0419   3.3797   3.7649   4.0809   4.4016   4.6898   4.9102   5.0774   5.1355   5.0258   4.8925   4.7705
   4.6454   4.4959   4.3495   4.2188   4.0779
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.2417   0.3370   0.5464   0.7562   0.8857   0.9060   0.8554   0.6873
   0.7712   0.9518   1.1936   1.4487   1.6563   1.8684   2.0611   2.2814   2.4997   2.6690   2.7940   3.0042   3.3070   3.6485
   4.0022   4.3764   4.7881   5.2160   5.5723
  **** 1       5      31  ****
   9.1246   7.1957   6.9933   6.9657   6.8557   6.9732   7.1466   7.4112   7.7609   8.1226   8.4757   8.7932   9.0866   9.7158
   9.9024  10.1319  10.4717  10.8439  11.2034  11.5438  11.9032  12.2312  12.6819  13.0748  13.4689  13.8568  14.2433  14.6389
  15.0546  15.4691  15.8700
   1.8522   1.8522   1.5078   1.5078   1.5078   1.6939   1.7201   1.5807   1.4901   1.4313   1.4858   1.6665   1.8862   2.7263
   3.2011   3.5968   3.8639   4.0739   4.2394   4.3488   4.4218   4.4725   4.5274   4.5795   4.6278   4.6715   4.7169   4.7650
   4.7889   4.7661   4.7118
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3528   0.5651   0.6286   0.6438   0.5610   0.5289   0.5416   0.5727
   0.6964   0.9541   1.2521   1.5570   1.9021   2.2864   2.6621   3.0122   3.3585   3.7028   4.0462   4.3973   4.7497   5.0915
   5.4113   5.7327   6.0673
  **** 1       6      31  ****
   9.0910   7.3590   7.1957   7.1713   7.0736   7.1862   7.3937   7.7650   8.1185   8.4277   8.8052   9.8075  10.3160  10.8064
  11.2617  11.6772  12.0526  12.3917  12.7146  13.0302  13.3449  13.6637  13.9880  14.3180  14.6510  14.9872  15.3250  15.6643
  16.0090  16.3652  16.7502
   2.1300   2.1300   1.8522   1.8522   1.8522   2.0118   2.0813   2.1433   2.2109   2.0790   1.8377   1.5893   1.6707   1.8579
   2.1022   2.3610   2.6102   2.8397   3.0341   3.1930   3.3091   3.3922   3.4452   3.4700   3.4726   3.4567   3.4217   3.3645
   3.2853   3.2117   3.1043
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3146   0.6257   0.9558   1.3100   1.5043   1.3142   1.2123   1.2001
   1.2929   1.4826   1.7521   2.0807   2.4461   2.8344   3.2383   3.6471   4.0565   4.4640   4.8700   5.2728   5.6732   6.0697
   6.4577   6.8363   7.1767
  **** 1       7      31  ****
   9.0516   7.5504   7.3590   7.3370   7.2493   7.3349   7.4966   7.7174   7.9508   8.3078   8.7081   9.7448  10.2502  10.7534
  11.2474  11.6608  12.1200  12.5165  12.9350  13.3470  13.7553  14.1796  14.6105  15.0502  15.4990  15.9518  16.4072  16.8633
  17.3248  17.7825  18.2124
   2.4556   2.4556   2.1300   2.1300   2.1300   2.2831   2.3487   2.3260   2.0997   1.8898   1.7275   1.8449   1.8578   1.8984
   1.9601   2.0538   2.2294   2.4676   2.4902   2.4945   2.4764   2.4177   2.3370   2.2415   2.1373   2.0362   1.9408   1.8524
   1.7716   1.7125   1.6240
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3535   0.7317   1.0259   1.1702   1.2459   1.3643   1.5055   1.6308
   1.8116   2.1214   2.3057   2.5541   2.8702   3.1955   3.5251   3.8287   4.1175   4.3880   4.6396   4.8854   5.1286   5.3693
   5.6101   5.8604   6.1484
  **** 1       8      31  ****
   8.9955   7.8234   7.5504   7.5314   7.4553   7.5286   7.7018   7.9297   8.1563   8.3848   8.6259   9.4514   9.9265  10.4267
  10.9391  11.4537  11.9531  12.4399  12.9209  13.3790  13.8176  14.2159  14.5977  14.9660  15.3215  15.6781  16.0409  16.4109
  16.7831  17.1515  17.5200
   2.9200   2.9200   2.4556   2.4556   2.4556   2.5889   2.6640   2.7128   2.7041   2.6397   2.5241   2.0376   1.8183   1.6621
   1.6019   1.6811   1.8397   2.0117   2.1525   2.2991   2.4336   2.5649   2.6691   2.7455   2.7939   2.7999   2.7696   2.7144
   2.6405   2.5604   2.4782
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3426   0.6428   0.9478   1.2446   1.5147   1.9441   1.9861   1.9540
   1.8565   1.7897   1.8238   1.9188   2.0751   2.2857   2.5409   2.8567   3.2016   3.5679   3.9512   4.3365   4.7147   5.0831
   5.4459   5.8113   6.1760
  **** 1       9      30  ****
   8.9394   8.0963   7.8234   7.8085   7.7491   7.8215   8.0172   8.2081   8.3934   8.5742   9.2000   9.5603   9.9588  10.3790
  10.8310  11.3112  11.8156  12.3355  12.8287  13.3247  13.8101  14.2599  14.6893  15.1001  15.4954  15.8770  16.2501  16.6196
  16.9900  17.3662
   3.3844   3.3844   2.9200   2.9200   2.9200   3.0141   3.0795   3.1279   3.1546   3.1569   2.9496   2.7343   2.5047   2.2245
   1.9609   1.7495   1.6144   1.5626   1.7054   1.8711   2.0393   2.2590   2.4741   2.6734   2.8443   2.9763   3.0758   3.1522
   3.2168   3.2698
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3272   0.5492   0.7795   1.0147   1.8319   2.1473   2.4006   2.5438
   2.5873   2.5708   2.5158   2.4650   2.3556   2.4019   2.5102   2.6685   2.8805   3.1397   3.4400   3.7755   4.1312   4.4963
   4.8626   5.2249
  **** 1      10      30  ****
   8.9047   8.2650   8.0963   8.0856   8.0430   8.1026   8.2960   8.4252   8.5488   8.6685   9.2312   9.5342   9.8631  10.2237
  10.6111  11.0265  11.4669  11.9272  12.4002  12.8843  13.3775  13.8808  14.3896  14.9031  15.4199  15.9384  16.4566  16.9714
  17.4782  17.9668
   3.6713   3.6713   3.3844   3.3844   3.3844   3.4454   3.4972   3.5285   3.5534   3.5701   3.5049   3.3863   3.2236   3.0384
   2.8628   2.6392   2.4262   2.2290   2.0579   1.9014   1.7606   1.6477   1.5546   1.4855   1.4394   1.4170   1.4261   1.4708
   1.5582   1.7032
  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200   0.1094   0.3328   0.4998   0.6721   0.8480   1.7320   2.1441   2.5196   2.8532
   3.1609   3.3913   3.5817   3.7394   3.8899   4.0192   4.1313   4.2290   4.3193   4.4038   4.4836   4.5631   4.6468   4.7398
   4.8452   4.9713
1

WAKE ELEMENTS      SURFACE # 1      STRIP # 11
*************      ***********      *********
  **** 1       1      18  ****
   9.2500   9.4500   9.8500  10.5375  11.2250  11.9125  12.6000  13.2875  13.9750  14.6625  15.3500  16.0375  16.7250  17.4125
  18.1000  18.7875  19.4750  20.1625
   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000   0.5000
   0.5000   0.5000   0.5000   0.5000
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  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200  -0.1200
  -0.1200  -0.1200  -0.1200  -0.1200
 **** 1        2       18  ****
   9.2346   9.4346   9 7944  10.4096  11.0434  11.6848  12.3200  12.9396  13.5404  14.1192  14.6683  15.1787  15.6455  16.0857
  16.5346  16.9778  17.4177  17.9244
   0.7253   0.7253   0.8091   0.9440   1.0674   1.1976   1.3342   1.4874   1.6581   1.8549   2.0760   2.3141   2.5455   2.7254
   2.8664   3.0079   3.1559   3.0279
  -0.1200  -0.1200   0.0333   0.3091   0.5450   0.7555   0.9803   1.2357   1.5232   1.8377   2.1873   2.5816   3.0302   3.5266
   4.0279   4.5340   5.0412   5.4879
 **** 1        3       18  ****
   9.2154   9.4154   9.7711  10.3717  10.9764  11.5696  12.1264  12.6528  13.1337  13.5805  14.0048  14.4061  14.7978  15.1790
  15 5690  15.9701  16.3885  16.7916
   1.0047   1.0047   1.1435   1.3906   1.6255   1.8732   2.1478   2.4194   2.6803   2.8962   3.0537   3.1589   3.2176   3.2353
   3.2191   3.1948   3.1760   3.2338
  -0.1200  -0.1200  -0.0006   0.2248   0.4524   0.6961   0.9916   1.3406   1.7569   2.2328   2.7502   3.2985   3.8604   4.4323
   4.9982   5.5560   6.1012   6.6552
 **** 1        4       18  ****
   9.2000   9.4000   9.7357  10.2790  10.7981  11.2554  11.6421  12.0152  12.4078  12.8345  13.3229  13.8069  14.2791  14.7612
  15.2398  15.7197  16.2071  16.6478
   1.2300   1.2300   1.4187   1.7661   2.1187   2.4826   2.8432   3.1856   3.5144   3.8117   4.0514   4.2302   4.3636   4.4406
   4.4480   4.3996   4.3095   4.0848
  -0.1200  -0.1200  -0.0119   0.2265   0.5074   0.8694   1.3088   1.7738   2.2325   2.6822   3.1025   3.5569   4.0384   4.5225
   5.0159   5.5058   5.9823   6.4597
 **** 1        5       18  ****
   9.1664   9.3664   9.6695  10.1259  10.4531  10.7367  11.2272  11.6529  12.0609  12.4574  13.0250  13.5900  14.1214  14.5995
  15.1041  15.5978  16.1037  16.5744
   1.5078   1.5078   1.7545   2.1953   2.6891   3.2652   3.6656   4.0262   4.4302   4.7120   4.6792   4.6840   4.7285   4.8442
   4.9734   5.0767   5.1687   5.1567
  -0.1200  -0.1200  -0.0348   0.2298   0.5788   0.8244   1.0921   1.4939   1.8720   2.3579   2.7444   3.1360   3.5700   4.0503
   4.4990   4.9662   5.4226   5.9235
 **** 1        6       18  ****
   9.1246   9.3246   9.5532   9.8637  10.2685  10.8087  11.3538  11.9225  12.4785  13.0567  13.6308  14.1871  14.7350  15.2883
  15.8475  16.3441  16.7592  17.1444
   1.8522   1.8522   2.1618   2.7198   3.2710   3.6255   3.9066   4.1006   4.2630   4.3691   4.4029   4.4015   4.3832   4.3685
   4.3923   4.5040   4.5665   4.5209
  -0.1200  -0.1200  -0.0109   0.2439   0.3141   0.5491   0.8597   1.1938   1.5641   1.9206   2.2973   2.7013   3.1162   3.5240
   3.9232   4.3854   4.9298   5.4974
 **** 1        7       18  ****
   9.0910   9.2910   9.5316  10.0900  10.6854  11.2296  11.8046  12.3383  12.8411  13.2869  13.6999  14.1057  14.5048  14.8894
  15.2735  15.6701  16.0613  16.4463
   2.1300   2.1300   2.4410   2.8234   2.9809   3.1890   3.3577   3.4990   3.5904   3.6717   3.7628   3.8427   3.9052   3.9414
   3.9556   3.9444   3.9168   3.8306
  -0.1200  -0.1200  -0.0465   0.0742   0.3798   0.7447   1.0817   1.4914   1.9514   2.4683   3.0104   3.5595   4.1159   4.6846
   5.2546   5.8160   6.3807   6.9438
 **** 1        8       18  ****
   9.0516   9.2516   9.6075  10.1961  10.6511  10.9664  11.2455  11.5392  12.0148  12.5315  13.1053  13.7095  14.3240  14.9086
  15.4435  15.8925  16.2980  16.7255
   2.4556   2.4556   2.5884   2.5978   2.8617   3.2445   3.7118   4.0548   4.3681   4.6177   4.8506   4.9559   4.9630   4.8667
   4.7614   4.6622   4.5893   4.5847
  -0.1200  -0.1200  -0.2454   0.1097   0.5524   1.0285   1.4485   1.9670   2.3521   2.7306   3.0292   3.3400   3.6481   3.9966
   4.4157   4.9268   5.4771   6.0156
 **** 1        9       18  ****
   8.9955   9.1955   9.5382  10.2240  10.8713  11.4084  11.8651  12.2641  12.6181  12.9602  13.3079  13.6962  14.1288  14.5994
  15.1041  15.6339  16.1783  16.6696
   2.9200   2.9200   3.1046   3.1529   2.9469   2.9577   3.0366   3.2020   3.4171   3.6334   3.8341   4.0223   4.1977   4.3549
   4.4754   4.5020   4.4746   4.2908
  -0.1200  -0.1200  -0.0281  -0.0344   0.0715   0.5006   1.0083   1.5433   2.0920   2.6477   3.2058   3.7410   4.2457   4.7216
   5.1726   5.6100   6.0290   6.4734
 **** 1       10       18  ****
   8.9394   9.1394   9.5241  10.1714  10.7832  11.4070  11.9883  12.5401  13.0450  13.5407  14.0151  14.4707  14.9211  15.3701
  15.8166  16.2540  16.6651  17.0670
   3.3844   3.3844   3.4166   3.4969   3.7691   3.8581   3.8857   3.8550   3.8454   3.8291   3.8319   3.8401   3.8459   3.8398
   3.8149   3.7589   3.6413   3.4730
  -0.1200  -0.1200  -0.0156   0.2020   0.3575   0.6324   0.9984   1.4075   1.8740   2.3501   2.8477   3.3624   3.8818   4.4024
   4.9246   5.4521   5.9904   6.5222
 **** 1       11       18  ****
   8.9047   9.1047   9.4073   9.8806  10.2758  10.6482  11.0909  11.5984  12..098  12.6039  13.0849  13.5573  14.0374  14.4984
  14.9620  15.4427  15.9399  16.4425
   3.6713   3.6713   3.7754   3.9746   4.1667   4.2312   4.1400   4.0782   4.0454   4.0077   3.9484   3.8343   3.6592   3.4297
   3.1927   2.9488   2.7042   2.4609
  -0.1200  -0.1200   0.1200   0.5771   1.1058   1.6802   2.1981   2.6578   3.1162   3.5927   4.0803   4.5666   5.0265   5.4819
   5.9310   6.3576   6.7646   7.1657
 LEFT WING FREE ELEMENT SHAPES
1

 ALPHA(DEG.)=35.000  MACH NUMBER= 0.100  ITERATION NUMBER= 3
     SIDESLIP ANGLE =      5.000 DEGREES
1

 LEADING EDGE ELEMENTS     SURFACE # 1     STRIP # 10
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**** 1	1	42 ****											
9.2346	5.7724	5.3001	5.2500	5.0500	5.4500	5.6957	5.9624	6.2291	6.4957	6.7624	7.0291	7.2957	7.5624
7.8291	8.0957	8.3624	8.6291	8.8957	9.1624	9.4291	9.9541	10.4791	11.0041	11.5291	12.0541	12.5791	13.1041
13.6291	14.1541	14.6791	15.2041	15.7291	16.2541	16.7791	17.3041	17.8291	18.3541	18.8791	19.4041	19.9291	20.4541
-0.7253	-0.7253	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000
-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000
-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000	-0.5000
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815
0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815
0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815	0.2815
**** 1	2	38 ****											
9.2154	6.3579	5.7724	5.7284	5.5531	5.8574	6.1257	6.4107	6.7024	6.9840	7.2399	7.4781	7.7121	7.9248
8.1083	8.2983	8.5178	8.7621	9.7449	10.2658	10.7777	11.2752	11.7544	12.2225	12.6813	13.1373	13.5908	14.0418
14.4917	14.9427	15.3959	15.8510	16.3061	16.7621	17.2190	17.6760	18.1093	18.5662				
-1.0047	-1.0047	-0.7253	-0.7253	-0.7253	-0.8995	-0.8705	-0.8444	-0.8603	-0.9325	-1.0729	-1.2390	-1.4075	-1.6005
-1.7988	-1.9382	-2.0109	-2.0520	-1.9693	-2.0209	-2.1262	-2.2714	-2.4498	-2.6101	-2.7553	-2.8820	-2.9967	-3.1025
-3.2011	-3.2940	-3.3835	-3.4742	-3.5662	-3.6591	-3.7548	-3.8546	-3.9732	-4.0677				
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.2406	0.2994	0.3033	0.2738	0.2610	0.2935	0.3406	0.3941
0.5052	0.6781	0.8566	1.0115	1.3718	1.4117	1.4617	1.5457	1.6648	1.8401	2.0502	2.2772	2.5157	2.7628
3.0146	3.2670	3.5164	3.7618	4.0069	4.2499	4.4901	4.7285	5.0002	5.2410				
**** 1	3	36 ****											
9.2000	6.8301	6.3579	6.3216	6.1769	6.3927	6.6091	6.8460	7.1077	7.3869	7.6661	7.9330	8.1823	8.4030
8.5866	8.7270	9.0369	9.3648	9.7634	10.1736	10.5826	10.9864	11.3788	11.8092	12.2288	12.6469	13.0732	13.5126
13.9589	14.4027	14.8487	15.2962	15.7418	16.1843	16.6246	17.0578						
-1.2300	-1.2300	-1.0047	-1.0047	-1.0047	-1.1975	-1.2136	-1.1733	-1.0943	-1.0181	-0.9976	-1.0509	-1.1703	-1.3458
-1.5663	-1.8193	-2.6791	-2.8351	-2.9524	-3.0843	-3.2281	-3.3837	-3.5668	-3.6515	-3.7088	-3.7391	-3.7462	-3.7446
-3.7528	-3.7730	-3.7762	-3.7856	-3.7929	-3.7940	-3.7928	-3.7969						
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.3166	0.4778	0.5727	0.5748	0.5014	0.4033	0.3174	0.2527
0.2149	0.2202	0.7372	1.1163	1.4373	1.7372	2.0333	2.3305	2.6274	2.9158	3.2261	3.5421	3.8485	4.1358
4.4122	4.6920	4.9689	5.2431	5.5207	5.8033	6.0891	6.3857						
**** 1	4	33 ****											
9.1664	6.9933	6.8301	6.8000	6.6800	6.8295	7.0705	7.3584	7.5866	7.8511	8.1650	8.5027	8.8316	9.6432
9.9441	10.1767	10.3755	10.6497	10.9386	11.2349	11.6821	12.1503	12.6034	13.0386	13.4589	13.8635	14.2584	14.6568
15.0506	15.4964	15.9544	16.4136	16.8674									
-1.5078	-1.5078	-1.2300	-1.2300	-1.2300	-1.4177	-1.5212	-1.6651	-1.7974	-1.7581	-1.6571	-1.6044	-1.6466	-2.2977
-2.7178	-3.1776	-3.6508	-4.0387	-4.3713	-4.7035	-4.8900	-4.9613	-4.9823	-4.9680	-4.9533	-4.9328	-4.9150	-4.9311
-4.9663	-5.0287	-5.0744	-5.0884	-5.0834									
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.2551	0.3735	0.5924	0.8070	0.9008	0.8734	0.7863	0.6455
0.7382	0.8386	0.9493	1.1728	1.4583	1.7366	1.9386	2.1653	2.4297	2.7230	3.0371	3.3710	3.7166	4.0581
4.4035	4.6737	4.9262	5.1803	5.4442									
**** 1	5	31 ****											
9.1246	7.1957	6.9933	6.9657	6.8557	6.9447	7.1041	7.3574	7.7119	8.0787	8.4171	8.7115	9.0014	9.6472
9.8472	10.0971	10.4051	10.7196	11.0426	11.3788	11.7264	12.0890	12.4662	12.8566	13.2573	13.6678	14.0902	14.5253
14.9717	15.4302	15.8981											
-1.8522	-1.8522	-1.5078	-1.5078	-1.5078	-1.7091	-1.7595	-1.6471	-1.5708	-1.5730	-1.7032	1.9200	-2.1284	-2.9508
-3.3316	-3.6061	-3.7765	-3.9087	-4.0055	-4.0505	-4.0528	-4.0273	-3.9835	-3.9260	-3.8537	-3.7676	-3.6722	-3.5771
-3.4868	-3.4062	-3.3334											
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.3585	0.5989	0.6536	0.6525	0.5976	0.6267	0.7106	0.8065
1.1075	1.4787	1.8683	2.2673	2.6697	3.0704	3.4638	3.8426	4.2052	4.5515	4.8829	5.1985	5.4955	5.7733
6.0346	6.2773	6.5040											
**** 1	6	31 ****											
9.0910	7.3590	7.1957	7.1713	7.0736	7.1555	7.3464	7.6927	8.0542	8.4339	8.8552	9.7209	10.2249	10.7360
11.2515	11.7702	12.2897	12.8102	13.3284	13.8442	14.3586	14.8711	15.3822	15.8910	16.3980	16.9090	17.4240	17.9411
18.4592	18.9776	19.4971											
-2.1300	-2.1300	-1.8522	-1.8522	-1.8522	-2.0296	-2.1247	-2.2130	-2.2328	-2.1346	-1.9258	-1.9730	-1.901[illegible]	-1.8399
-1.7948	-1.7677	-1.7510	-1.7422	-1.7718	-1.8035	-1.8348	-1.8702	-1.9058	-1.9325	-1.9369	-1.9259	-1.9167	-1.9186
-1.9324	-1.9582	-1.9865											
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.3204	0.6532	[illegible].9809	1.2718	1.4040	1.9963	2.1243	2.2274
2.3163	2.3925	2.4663	2.5345	2.6137	[illegible].7059	2.8064	2.9143	3.0290	3.1557	3.2918	3.4119	3.5136	3.6041
3.6878	3.7670	3.8374											
**** 1	7	31 ****											
9.0516	7.5504	7.3590	7.3370	7.2493	7.2840	7.4200	7.6293	7.8685	8.1757	8.3485	9.5413	10.0147	10.4512
10.8536	11.2299	11[illegible]5827	11.9199	12.2420	12.5542	12.8614	13.1699	13.4812	13.7957	14.1133	14.4339	14.7589	15.0892
15.4243	15.7698	1[illegible].329											
-2.4556	-2.4556	-[illegible]1300	-2.1300	-2.1300	-2.3019	-2.3907	-2.4121	-2.2887	-2.0685	-1.8457	-1.7406	-1.9523	-2.2408
-2.5435	-2.8288	-3.0870	-3.3171	-3.5197	-3.7075	-3.8693	-3.9938	-4.0713	-4.1063	-4.1230	-4.1385	-4.1492	-4.1471
-4.1313	-4.1032	-4.0782											
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	0.1094	0.3617	0.7464	1.0926	1.3148	1.3752	1.0497	0.9680	1.0111
1.1599	1.3893	1.6799	2.0100	2.3717	2.7497	3.1435	3.5497	3.9653	4.3842	4.8019	5.2174	5.6295	6.0375
6.4414	6.8357	7.2141											
**** 1	8	31 ****											
8.9955	7.8234	7.5504	7.5314	7.4553	7.6937	7.8804	8.1180	8,3587	8.6051	8.8663	9.7056	10.1779	10.6667
11.1637	11.6631	12.1578	12.6485	13.1522	13.6346	14.1564	14.6589	15.1586	15.6611	16.1660	16.6731	17.1819	17.6919
18.2036	18.7172	19.2318											
-2.9200	-2.9200	-2.4556	-2.4556	-2.4556	-2.5317	-2.6766	-2.8197	-2.9108	-2.9451	-2.9229	-2.6994	-2.6002	-2.5279
-2.4817	-2.4628	-2.4527	-2.4476	-2.4439	-2.4442	-2.4458	-2.4490	-2.4597	-2.4716	-2.4864	-2.5074	-2.5360	-2.5736
-2.6179	-2.6658	-2.7141											
-0.1200	-0.1200	-0.1200	-0.1200	-0.1200	-0.0053	0.1795	0.4394	0.7191	1.0064	1.2816	1.8715	2.0783	2.2557
2.4183	2.5793	2.7548	2.9412	3.0893	3.2417	3.3960	3.5480	3.7085	3.8603	4.0032	4.1378	4.2640	4.3826

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   4.4906    4.5894    4.6813
 **** 1       9       30  ****
   8.9394    8.0963    7.8234    7.8085    7.7491    7.7944    7.9727    8.1444    8.3115    8.4782    9.1175    9.4964    9.9077   10.3514
  10.8166   11.2975   11.7901   12.2915   12.8019   13.3171   13.8352   14.3549   14.8744   15.3927   15.9087   16.4249   16.9443   17.4664
  17.9892   18.5114
  -3.3844   -3.3844   -2.9200   -2.9200   -2.9200   -3.0297   -3.1149   -3.1784   -3.2178   -3.2312   -3.0674   -2.9272   -2.7880   -2.6300
  -2.4682   -2.3177   -2.1776   -2.0511   -1.9490   -1.8622   -1.7861   -1.7136   -1.6386   -1.5648   -1.4998   -1.4632   -1.4620   -1.4856
  -1.5256   -1.5796
  -0.1200   -0.1200   -0.1200   -0.1200   -0.1200    0.1094    0.3351    0.5687    0.8108    1.0559    1.8726    2.2078    2.5030    2.7349
   2.9165    3.0640    3.1796    3.2701    3.3384    3.3904    3.4273    3.4457    3.4389    3.3990    3.3276    3.2392    3.1627    3.1121
   3.0861    3.0812
 **** 1      10       30  ****
   8.9047    8.2650    8.0963    8.0856    8.0430    8.2532    8.4655    8.6055    8.7396    8.8699    9.4818    9.7974   10.1380   10.5079
  10.9026   11.3045   11.7178   12.1625   12.6524   13.1663   13.6803   14.1882   14.6862   15.1772   15.6621   16.1387   16.5957   17.0000
  17.3087   17.6990
  -3.6713   -3.6713   -3.3844   -3.3844   -3.3844   -3.4351   -3.5591   -3.6333   -3.7016   -3.7638   -3.9503   -3.9506   -3.8923   -3.7909
  -3.6690   -3.5060   -3.2985   -3.0744   -2.9075   -2.8299   -2.8011   -2.8236   -2.8766   -2.9431   -3.0252   -3.1303   -3.2702   -3.4511
  -3.4967   -3.3411
  -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.0053    0.1666    0.3096    0.4610    0.6182    1.4508    1.8703    2.2656    2.6240
   2.9480    3.2439    3.4924    3.6588    3.7466    3.8212    3.9242    4.0550    4.2126    4.3862    4.5698    4.7634    4.9808    5.2626
   5.6848    5.9995
1

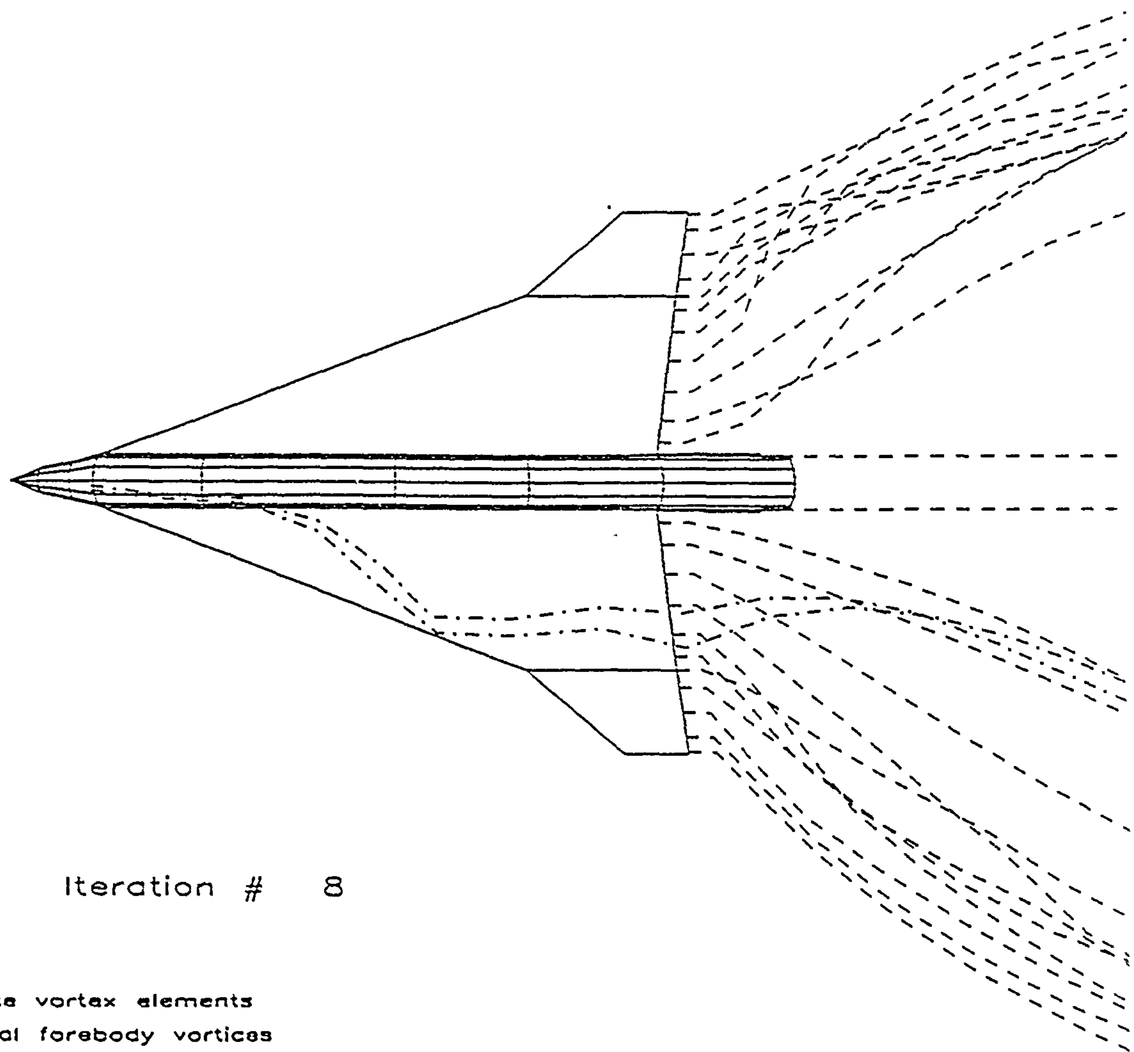
 WAKE ELEMENTS      SURFACE # 1      STRIP # 11
 *************      ***********     *********
 **** 1       1       18  ****
   9.2500    9.4500    9.8500   10.5375   11.2250   11.9125   12.6000   13.2875   13.9750   14.6625   15.3500   16.0375   16.7250   17.4125
  18.1000   18.7875   19.4750   20.1625
  -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000   -0.5000
  -0.5000   -0.5000   -0.5000   -0.5000
  -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200   -0.1200
  -0.1200   -0.1200   -0.1200   -0.1200
 **** 1       2       18  ****
   9.2346    9.4346    9.7988   10.4244   11.0694   11.7264   12.3832   13.0346   13.6807   14.3215   14.9589   15.5912   16.2191   16.8428
  17.4586   18.0584   18.6473   19.2260
  -0.7253   -0.7253   -0.8046   -0.9345   -1.0416   -1.1422   -1.2398   -1.3426   -1.4539   -1.5776   -1.7096   -1.8553   -2.0128   -2.1791
  -2.3593   -2.5622   -2.7816   -3.0136
  -0.1200   -0.1200    0.0250    0.2789    0.4912    0.6670    0.8454    1.0397    1.2466    1.4628    1.6840    1.9112    2.1428    2.3794
   2.6263    2.8941    3.1729    3.4627
 **** 1       3       18  ****
   9.2154    9.4154    9.7708   10.3786   10.9989   11.6319   12.2632   12.8827   13.4880   14.0732   14.6397   15.1865   15.7181   16.2368
  16.7434   17.2401   17.7276   18.1993
  -1.0047   -1.0047   -1.1444   -1.3860   -1.6068   -1.8115   -2.0119   -2.2194   -2.4379   -2.6716   -2.9120   -3.1513   -3.3847   -3.6073
  -3.8217   -4.0239   -4.2206   -4.4192
  -0.1200   -0.1200   -0.0009    0.2109    0.4086    0.5823    0.7667    0.9806    1.2225    1.4975    1.8039    2.1451    2.5133    2.9057
   3.3182    3.7483    4.1914    4.6504
 **** 1       4       18  ****
   9.2000    9.4000    9.7318   10.2866   10.8315   11.3455   11.8052   12.1971   12.5805   12.9940   13.4302   13.8813   14.3258   14.7463
  15.1626   15.6027   16.0637   16.5590
  -1.2300   -1.2300   -1.4163   -1.7520   -2.0953   -2.4578   -2.8296   -3.1646   -3.4140   -3.5967   -3.7588   -3.9148   -4.0780   -4.2295
  -4.3283   -4.3729   -4.4069   -4.5296
  -0.1200   -0.1200    0.0032    0.2317    0.4721    0.7499    1.1007    1.5555    2.0688    2.5867    3.0928    3.5877    4.0861    4.6093
   5.1466    5.6729    6.1818    6.6425
 **** 1       5       18  ****
   9.1664    9.3664    9.6681   10.1314   10.5353   10.8687   11.2056   11.7034   12.2596   12.8096   13.3948   13.9817   14.5184   15.0464
  15.5640   16.1073   16.6742   17.2013
  -1.5078   -1.5078   -1.7471   -2.1898   -2.6604   -3.1559   -3.6579   -4.0068   -4.2197   -4.3719   -4.4988   -4.5954   -4.6820   -4.7500
  -4.7970   -4.8843   -5.0193   -5.2604
  -0.1200   -0.1200   -0.0120    0.2371    0.5338    0.8745    1.2018    1.5229    1.8663    2.2498    2.5875    2.9323    3.3531    3.7881
   4.2382    4.6504    5.0152    5.3849
 **** 1       6       18  ****
   9.1246    9.3246    9.5663    9.7837   10.2762   10.8884   11.4834   12.0194   12.5050   12.9669   13.3931   13.8541   14.3522   14.8649
  15.4077   15.9591   16.5037   17.0359
  -1.8522   -1.8522   -2.1480   -2.7280   -3.2077   -3.3881   -3.5413   -3.6872   -3.8234   -3.9430   -4.0621   -4.2062   -4.3724   -4.4963
  -4.5860   -4.6142   -4.5952   -4.5454
  -0.1200   -0.1200   -0.0012    0.2972    0.2971    0.5527    0.8611    1.2663    1.7334    2.2284    2.7546    3.2438    3.6876    4.1289
   4.5409    4.9505    5.3697    5.8020
 **** 1       7       18  ****
   9.0910    9.2910    9.5511   10.0261   10.3359   10.5939   10.8543   11.2883   11.6663   12.1682   12.6496   13.1544   13.6734   14.2073
  14.7380   15.2462   15.7538   16.2124
  -2.1300   -2.1300   -2.4243   -2.7715   -3.3116   -3.9096   -4.4127   -4.7612   -4.7543   -4.8313   -4.9491   -5.0430   -5.0947   -5.0997
  -5.0451   -4.9517   -4.8568   -4.6937
  -0.1200   -0.1200   -0.0443    0.3114    0.6028    0.8230    1.2127    1.6162    2.1903    2.6539    3.1303    3.5875    4.0354    4.4686
   4.9022    5.3557    5.8095    6.2951
 **** 1       8       18  ****
   9.0516    9.2516    9.3790   10.2583   10.8019   11.2472   11.5583   11.8778   12.2653   12.6798   13.0862   13.4646   13.8457   14.3013
  14.7467   15.2455   15.7871   16.3476
  -2.4556   -2.4556   -2.6772   -2.7829   -2.9964   -3.2109   -3.4566   -3.8269   -4.1277   -4.3550   -4.5009   -4.5952   -4.7251   -4.8648
  -5.0013   -5.0572   -5.0371   -4.9836
  -0.1200   -0.1200   -0.1810   -0.1695    0.1931    0.6710    1.2327    1.7158    2.1975    2.6967    3.2317    3.7978    4.3552    4.8507
```

```
 5.3563   5.8261   6.2491   6.6436
**** 1      9      18  ****
 8.9955   9.1955   9.4999   9.9789  10.3462  10.7483  11.2348  11.7357  12.1387  12.6374  13.1499  13.6330  14.0725  14.4345
14.7640  15.1046  15.4867  15.9372
-2.9200  -2.9200  -3.1617  -3.5074  -3.9608  -4.3983  -4.6478  -4.9702  -5.1614  -5.0608  -4.8850  -4.7462  -4.6377  -4.5987
-4.5966  -4.5633  -4.4972  -4.4519
-0.1200  -0.1200  -0.0256   0.3261   0.6897   1.0355   1.4522   1.7955   2.3187   2.7811   3.2043   3.6734   4.1908   4.7739
 5.3773   5.9736   6.5413   7.0587
**** 1     10      18  ****
 8.9394   9.1394   9.5096  10.0758  10.6248  11.1318  11.6324  12.1340  12.7211  13.3334  13.9303  14.5001  14.9690  15.4498
15.9540  16.4872  17.0452  17.6043
-3.3844  -3.3844  -3.5189  -3.8069  -4.0494  -4.2868  -4.5209  -4.7370  -4.8305  -4.8597  -4.9426  -5.0807  -5.2904  -5.4318
-5.5473  -5.6198  -5.6401  -5.6070
-0.1200  -0.1200  -0.0505   0.2124   0.5477   0.9468   1.3558   1.7734   2.1185   2.4299   2.7608   3.1198   3.5768   4.0474
 4.5003   4.9281   5.3292   5.7280
**** 1     11      18  ****
 8.9047   9.1047   9.4008   9.9045  10.4150  10.9593  11.5252  12.0108  12.4674  12.9157  13.4351  14.0601  14.6809  15.1452
15.5690  16.0015  16.4658  16.9529
-3.6713  -3.6713  -3.8502  -4.1435  -4.4202  -4.6835  -4.8542  -4.9979  -5.2609  -5.1079  -4.8282  -4.6447  -4.8269  -5.1304
-5.3357  -5.4144  -5.4032  -5.2944
-0.1200  -0.1200   0.0808   0.4454   0.8134   1.1407   1.4917   1.9567   2.3983   2.8966   3.2496   3.4696   3.7022   4.1082
 4.6091   5.1378   5.6447   6.1175
```

APPENDIX C

SAMPLE PLOTS FOR F-16XL CONFIGURATION

SAMPLE PLOTS FOR F5 CONFIGURATION



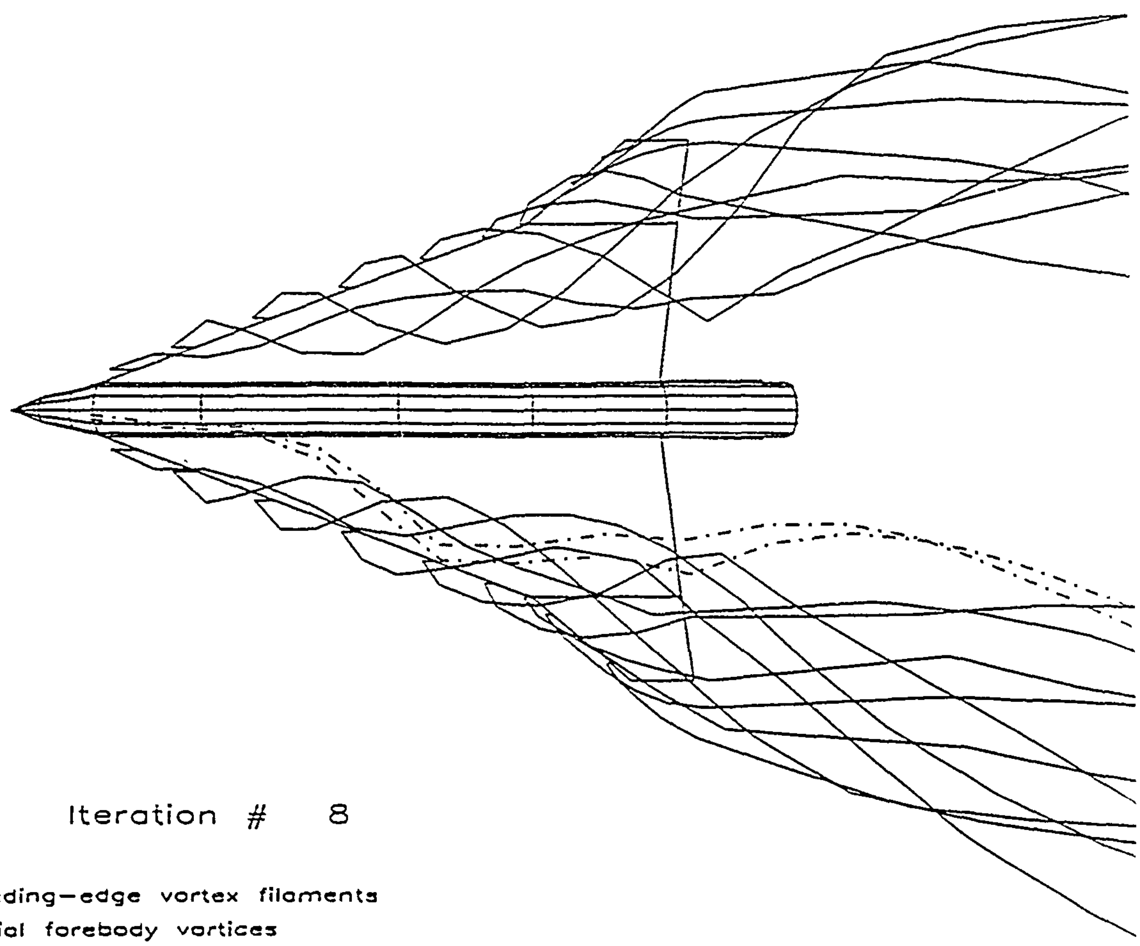
Iteration # 8

- - - - - - Wake vortex elements

-.-.-.-.- Initial forebody vortices

$\alpha = 30.$ $M = 0.1$ $\beta = 4.584$

F-16XL WITH FREE VORTEX FILAMENTS

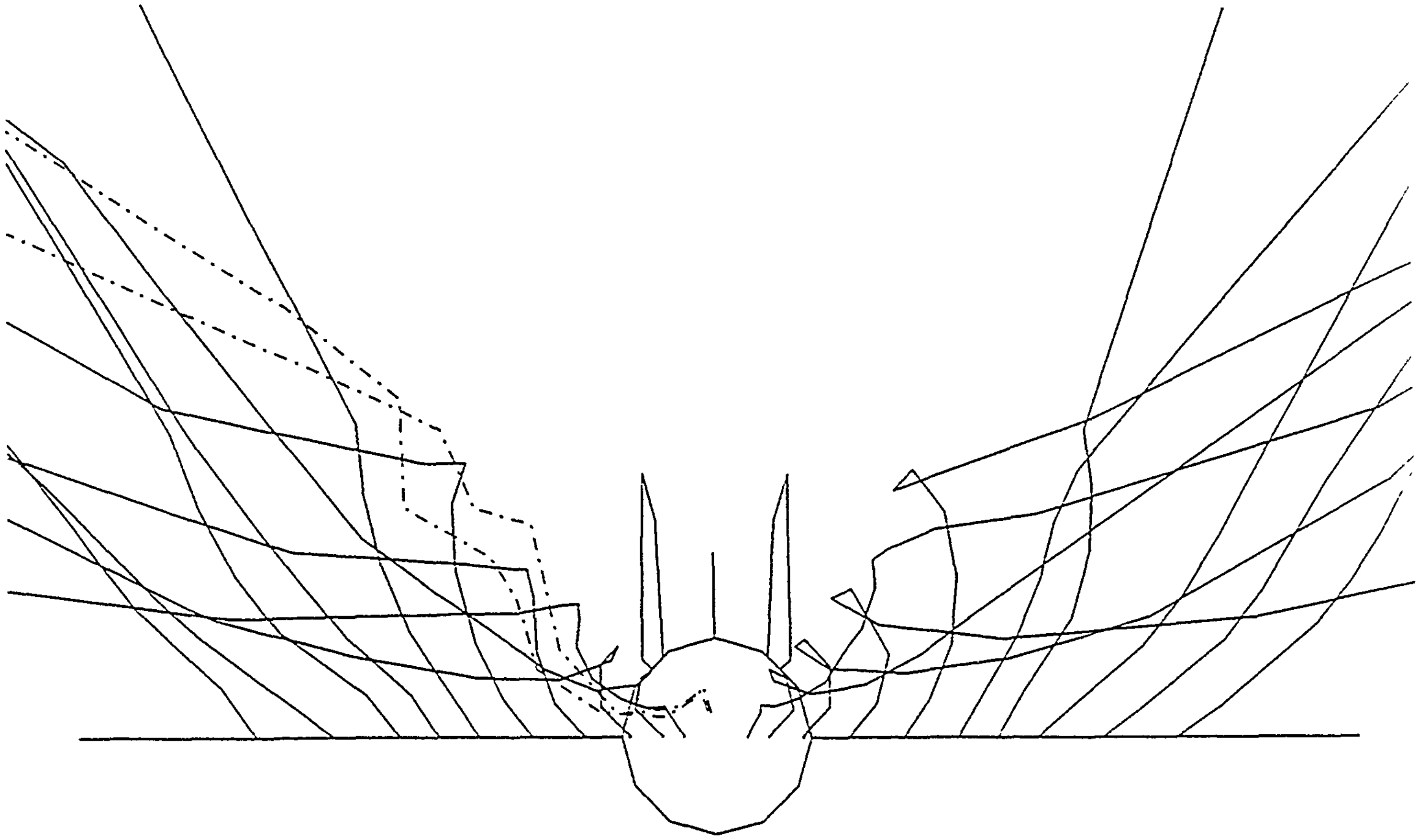


Iteration # 8

——————— Leading-edge vortex filaments
-·-·-·-·- Initial forebody vortices

$\alpha = 30.$ $M = 0.1$ $\beta = 4.584$

F-16XL WITH FREE VORTEX FILAMENTS

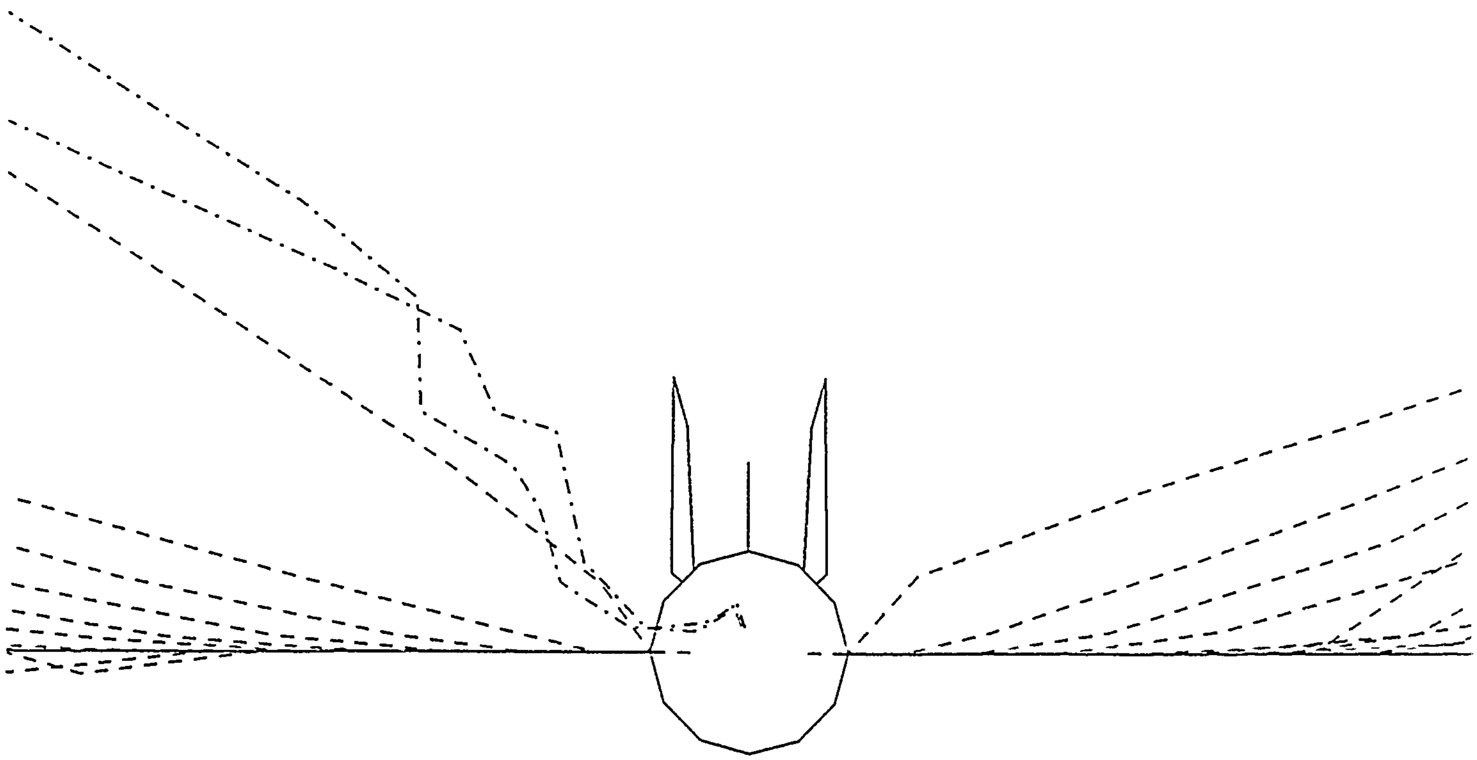


Iteration # 8

Leading—edge vortex filaments
Initial forebody vortices

$\alpha = 30.$ M = 0.1 $\beta = 4.584$

F—16XL WITH FREE VORTEX FILAMENTS

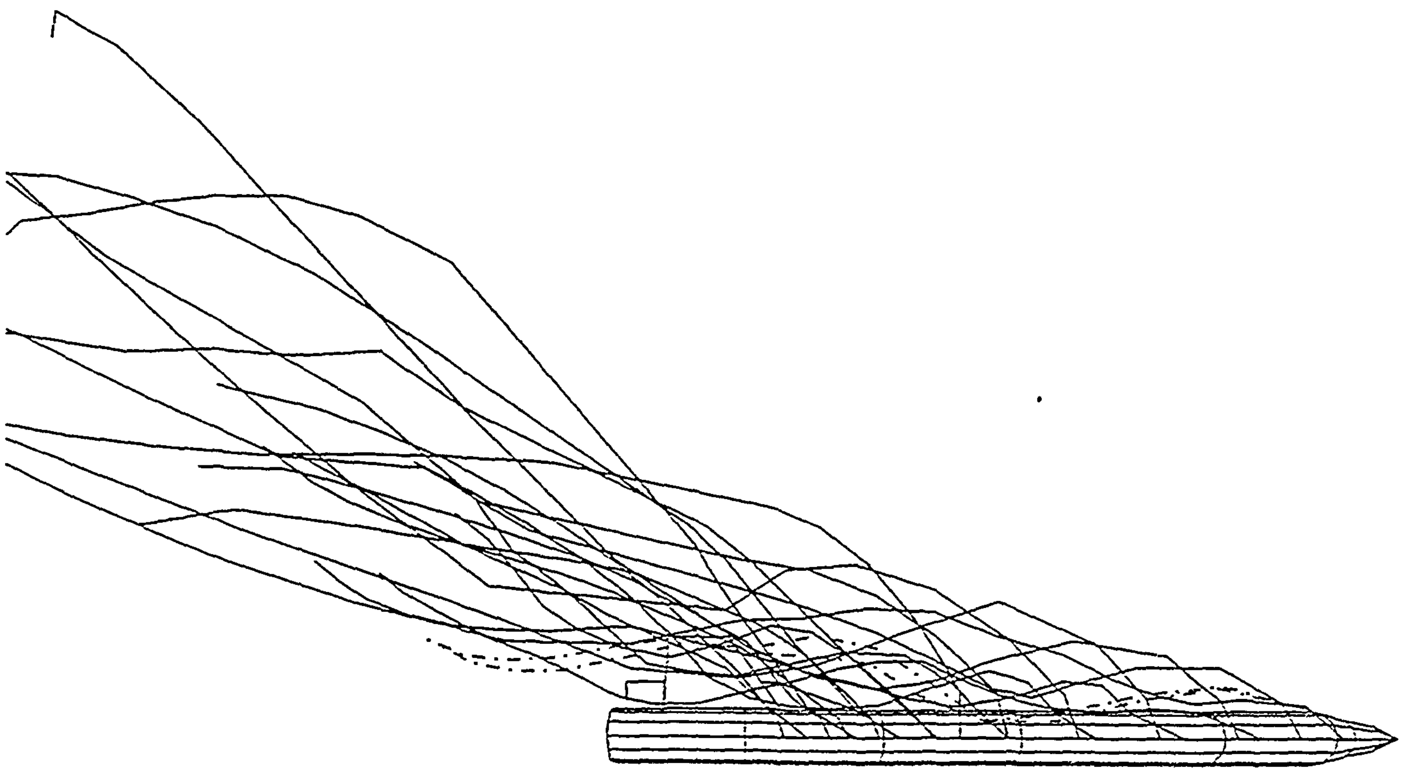


Iteration # 8

------ Wake vortex elements
-·-·-·-· Initial forebody vortices

α= 30. M = 0.1 β= 4.584

F−16XL WITH FREE VORTEX FILAMENTS



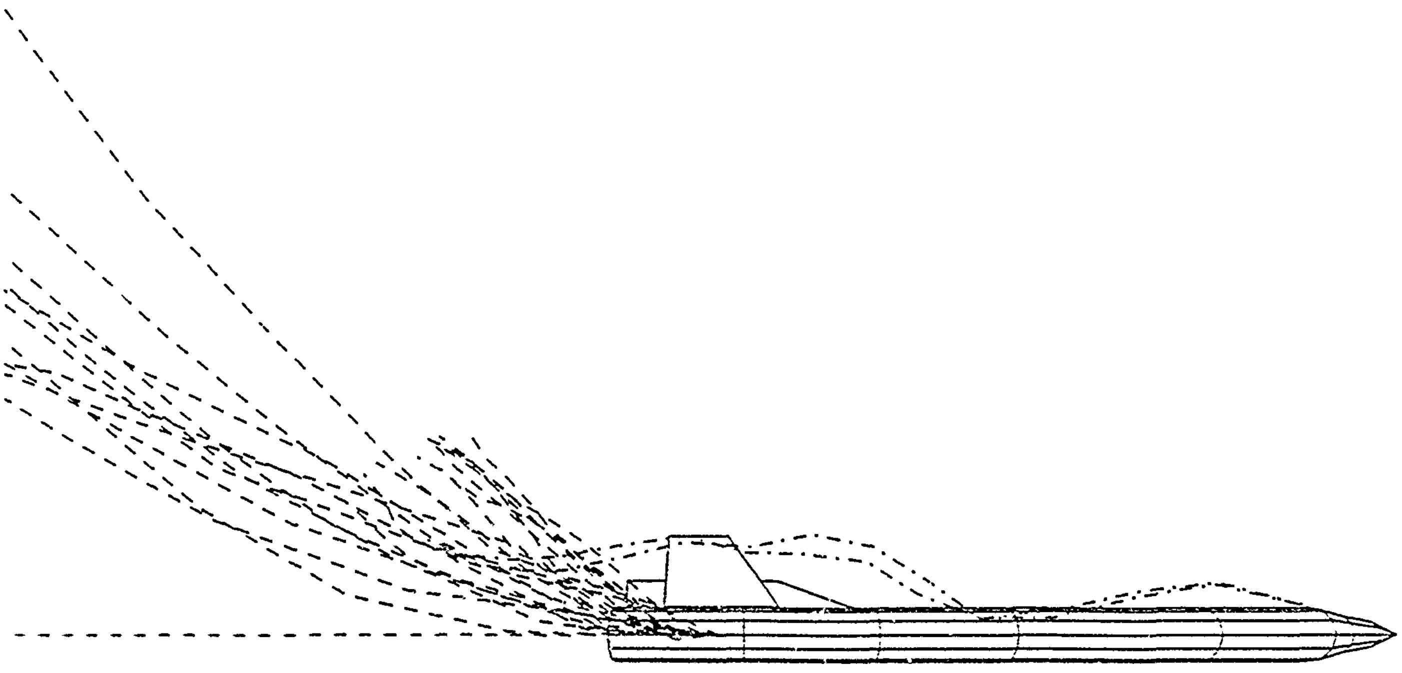
Iteration # 8

——— Leading-edge vortex filaments

-·-·-·-· Initial forebody vortices

$\alpha = 30.$ $M = 0.1$ $\beta = 4.584$

F-16XL WITH FREE VORTEX FILAMENTS

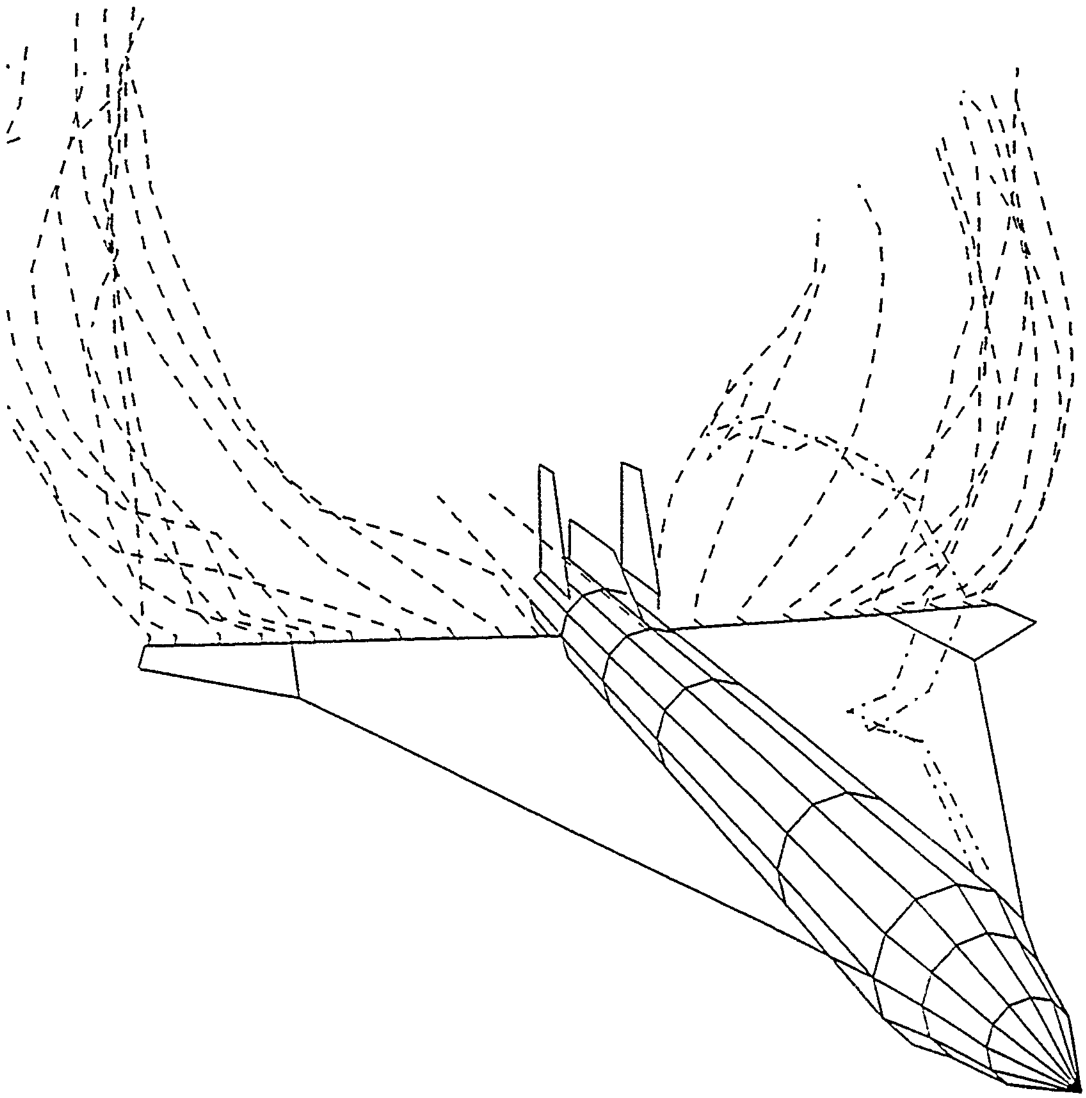


Iteration # 8

------ Wake vortex elements
-.-.-.-.- Initial forebody vortices

$\alpha = 30.$ M = 0.1 $\beta = 4.584$

F—16XL WITH FREE VORTEX FILAMENTS

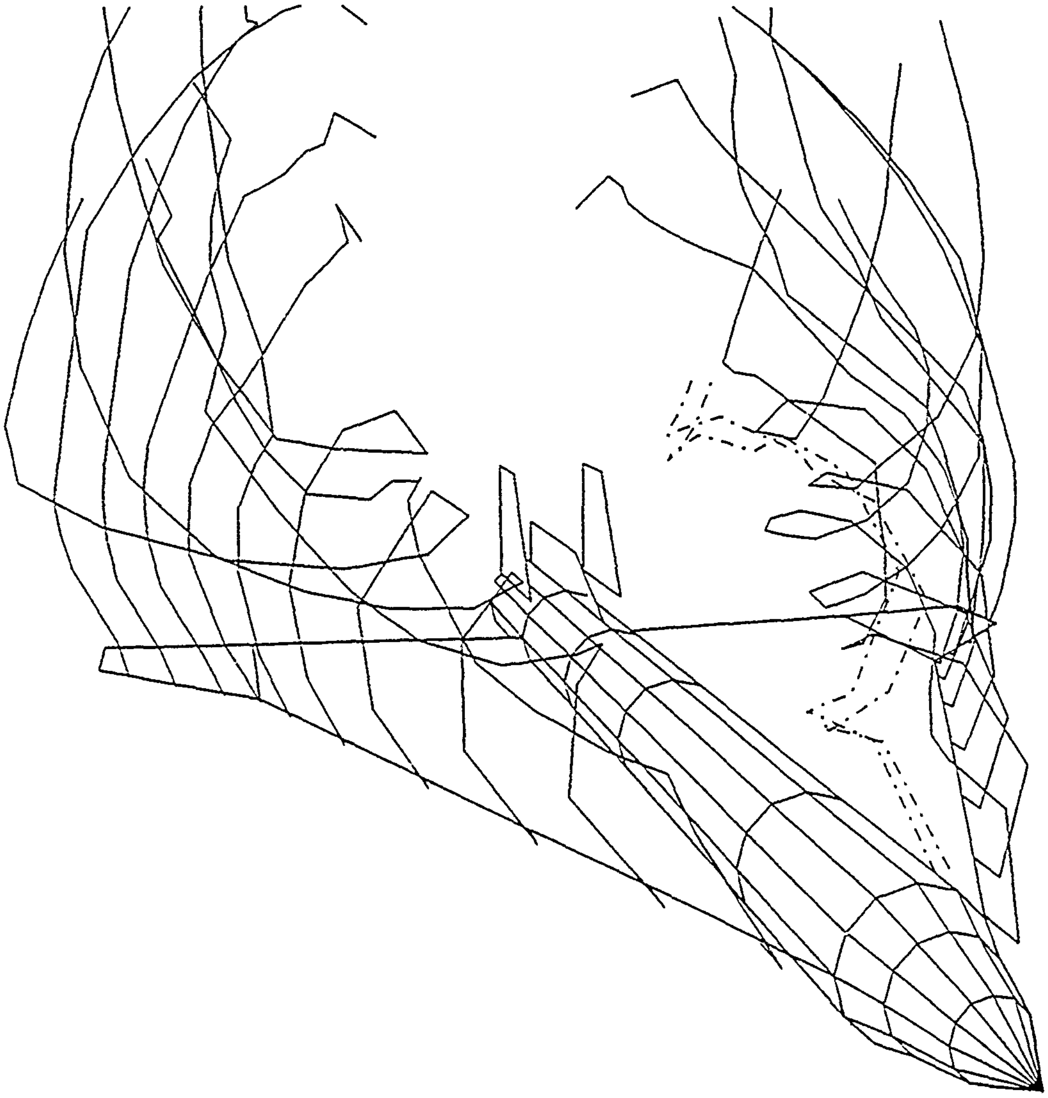


Iteration # 8

- - - - - - Wake vortex elements
- . - . - . - . - Initial forebody vortices

$\alpha = 30.$ M = 0.1 $\beta = 4.584$

F-16XL WITH FREE VORTEX FILAMENTS

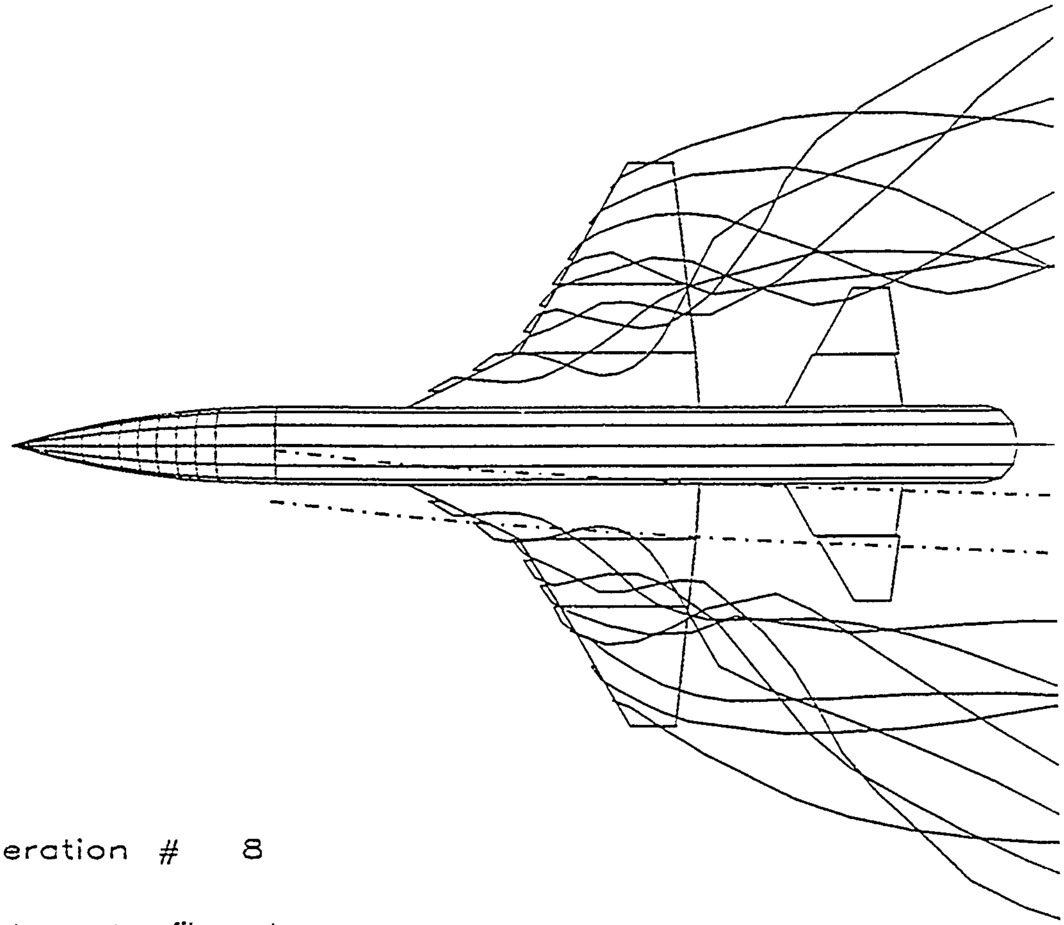


Iteration # 8

——————— Leading-edge vortex filaments
-·-·-·-·- Initial forebody vortices

$\alpha = 30.$ $M = 0.1$ $\beta = 4.584$

F-16XL WITH FREE VORTEX FILAMENTS



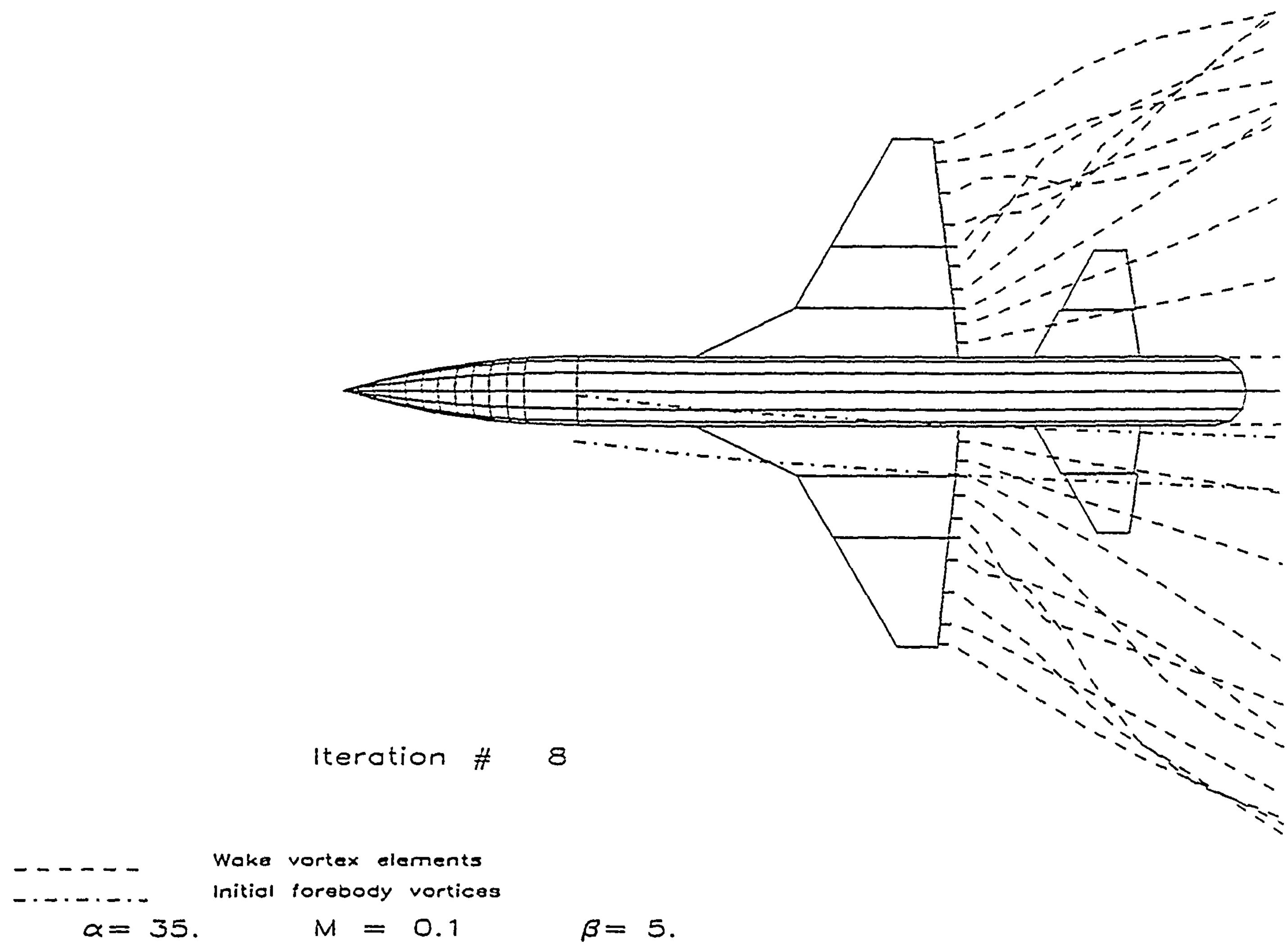
Iteration # 8

——————— Leading–edge vortex filaments

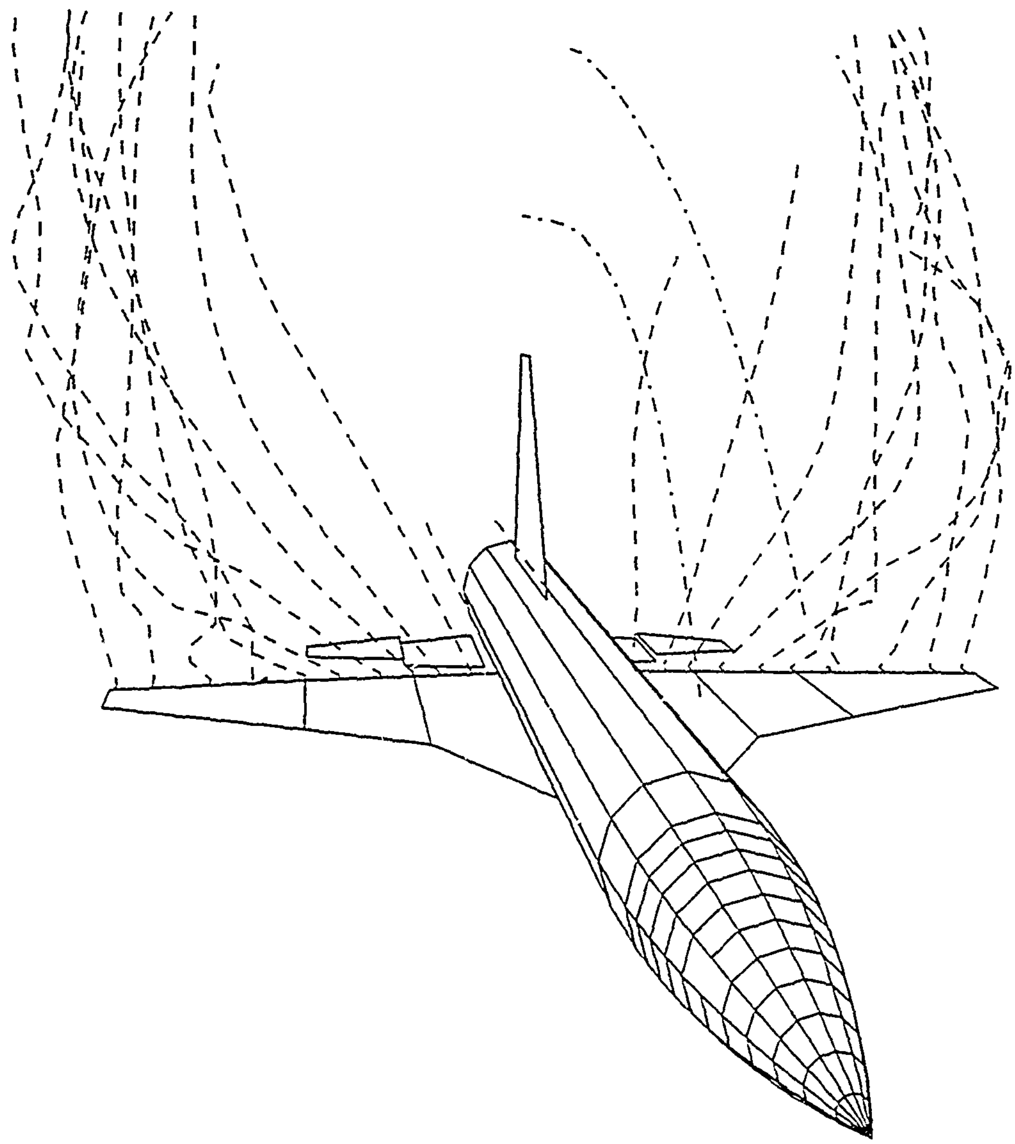
\- · - · - · - · - Initial forebody vortices

$\alpha = 35.$ $M = 0.1$ $\beta = 5.$

F–5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT



F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT

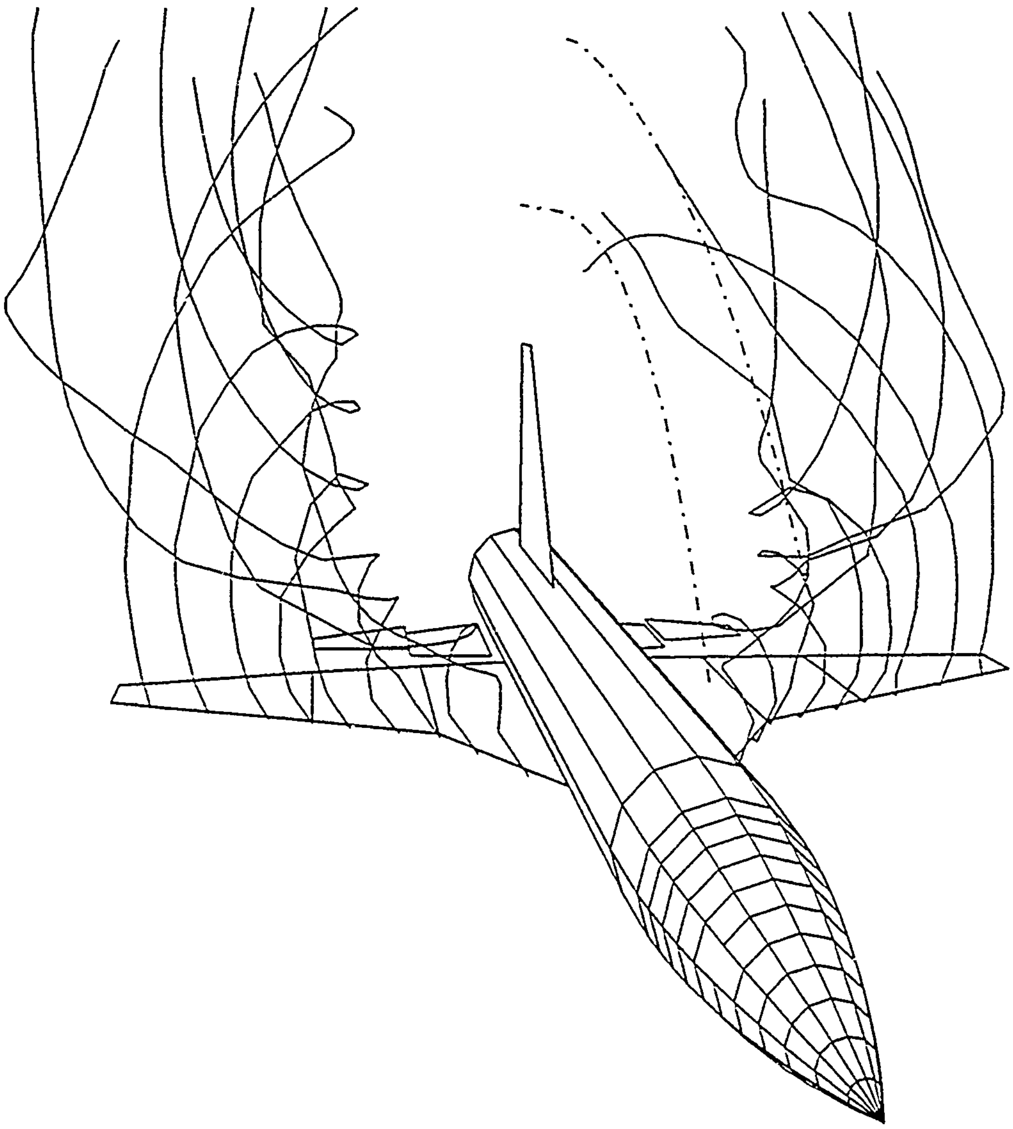


Iteration # 8

- - - - - - Wake vortex elements
-.-.-.-.- Initial forebody vortices

$\alpha = 35.$ $M = 0.1$ $\beta = 5.$

F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT



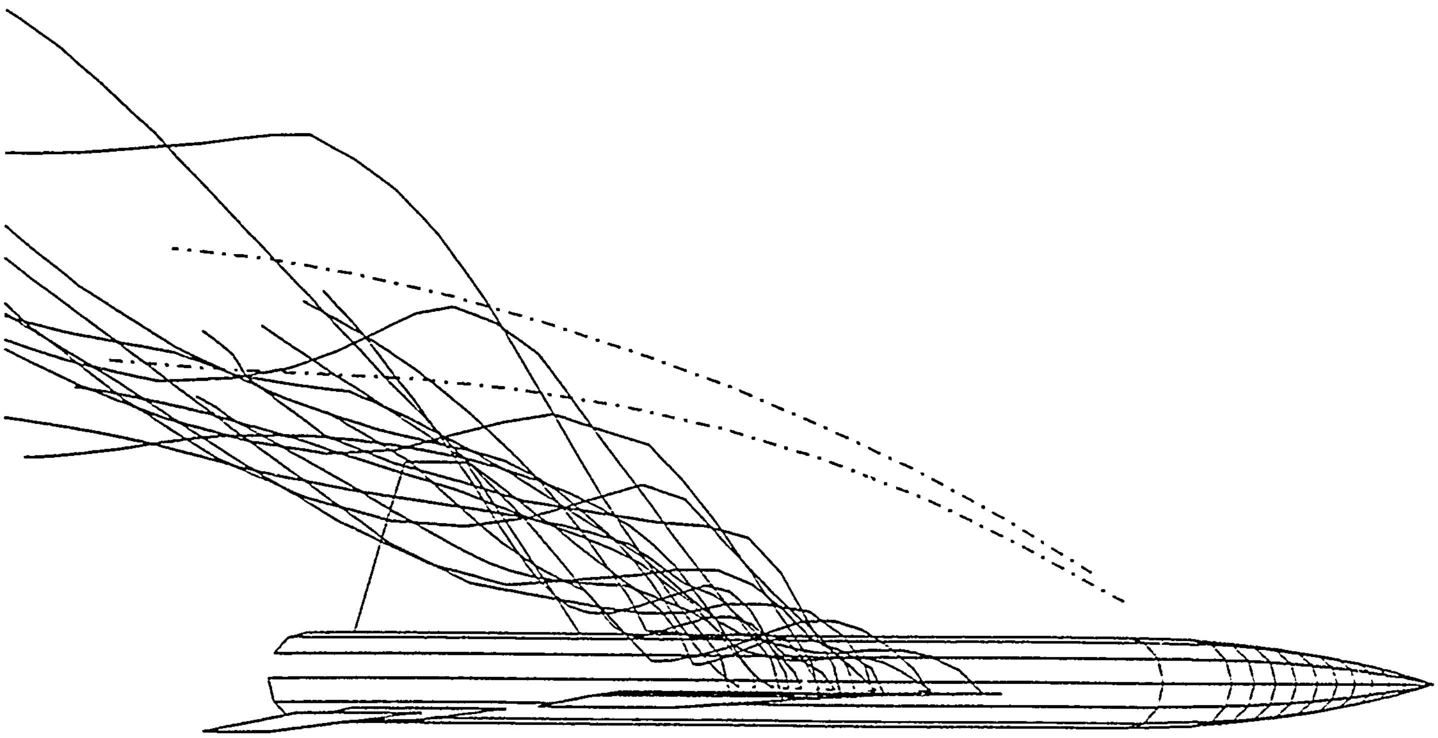
Iteration # 8

____________ Leading-edge vortex filaments

_ . _ . _ . _ . _ . Initial forebody vortices

$\alpha = 35.$ $M = 0.1$ $\beta = 5.$

F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT

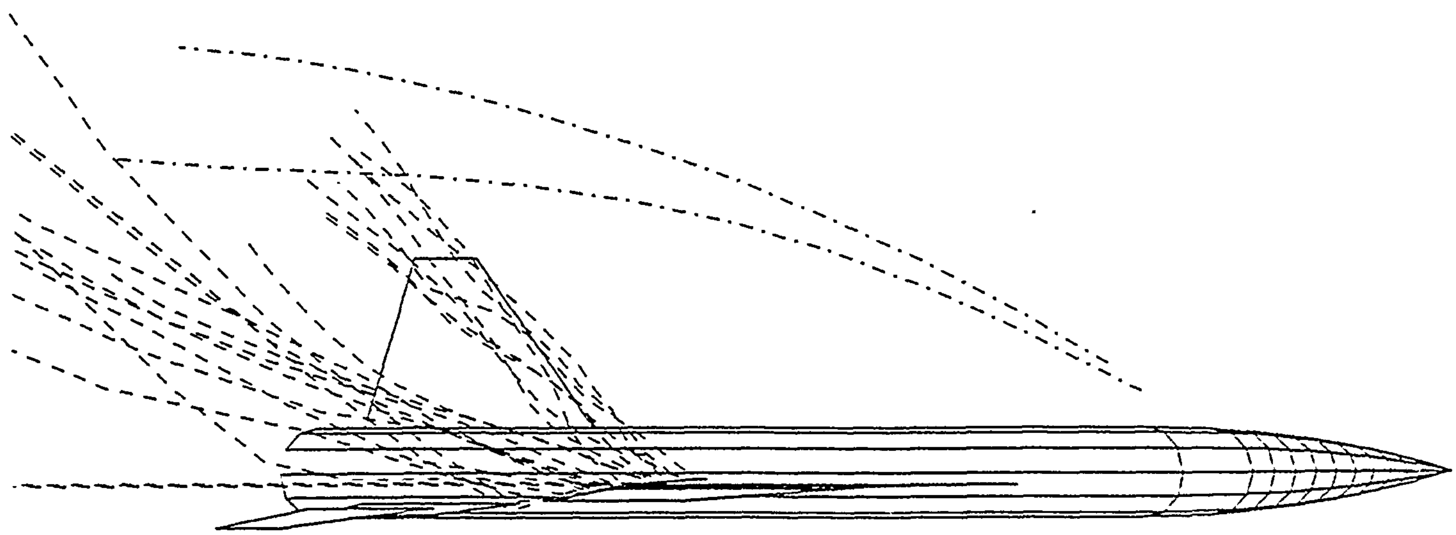


Iteration # 8

Leading—edge vortex filaments
Initial forebody vortices

$\alpha = 35.$ M = 0.1 $\beta = 5.$

F—5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT

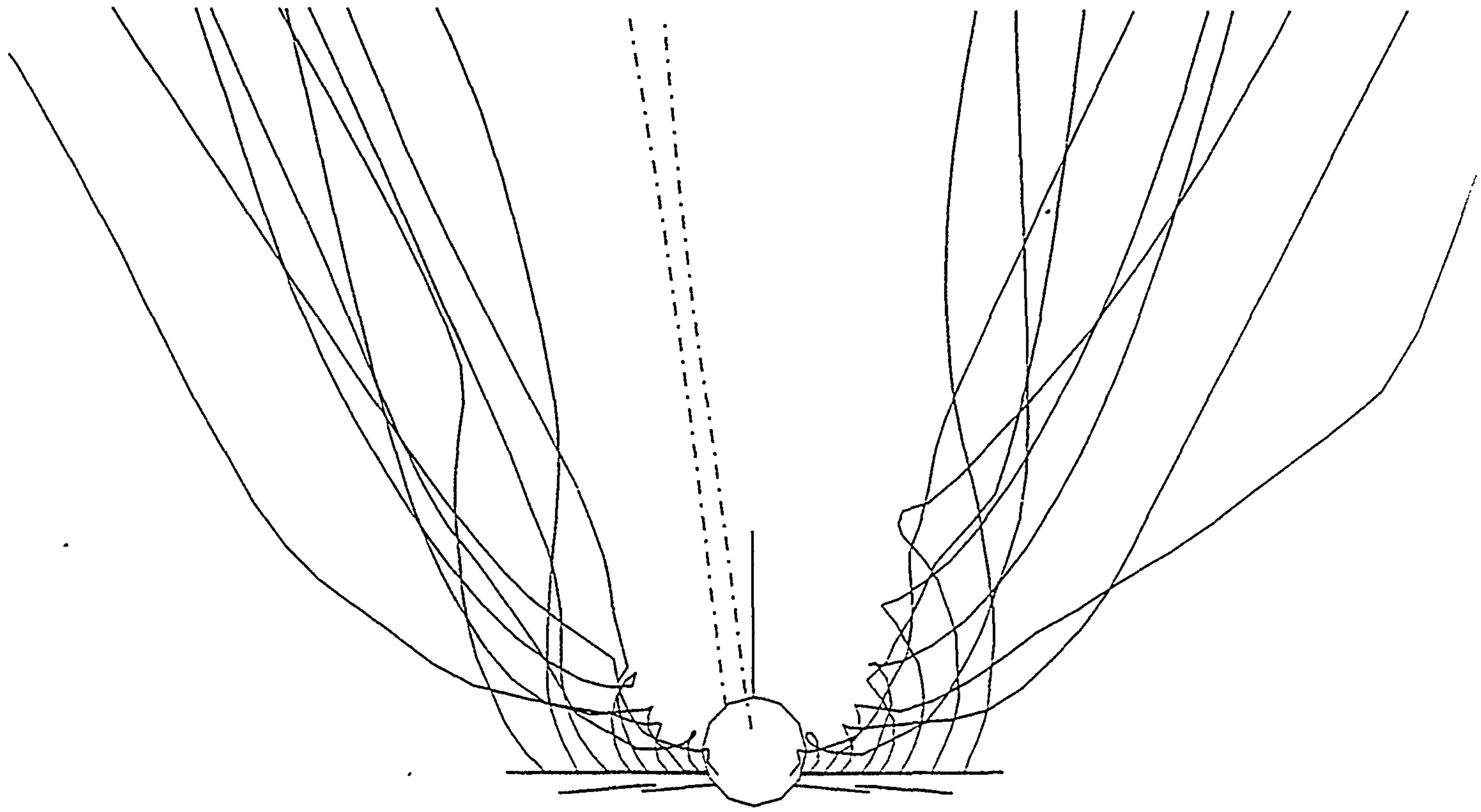


Iteration # 8

- - - - - - Wake vortex elements
-·-·-·-·- Initial forebody vortices

α= 35.   M = 0.1 β= 5.

F-5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT



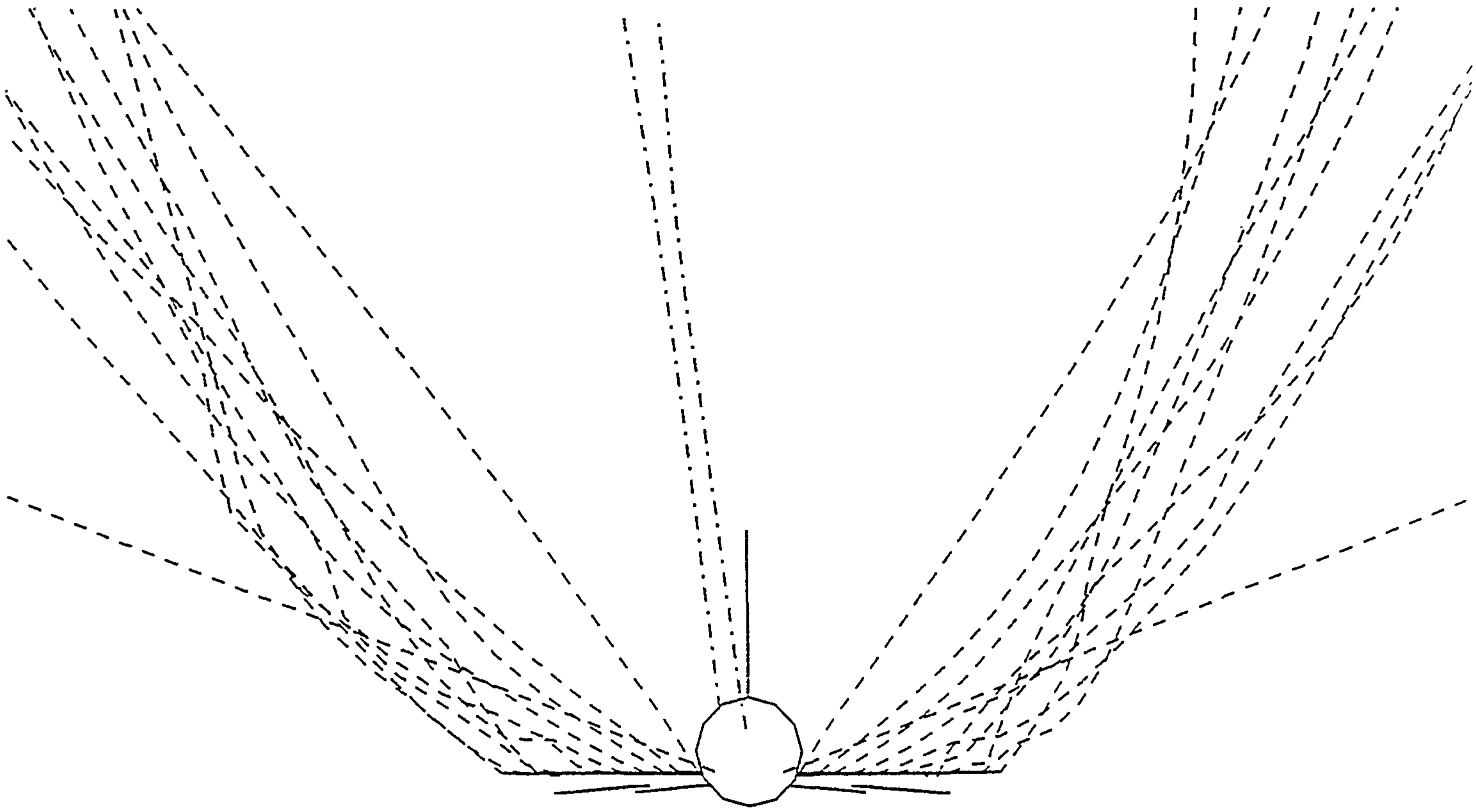
Iteration # 8

Leading—edge vortex filaments

Initial forebody vortices

$\alpha = 35.$ M = 0.1 $\beta = 5.$

F—5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT



Iteration # 8

- - - - - - Wake vortex elements
- . - . - . - . - Initial forebody vortices

$\alpha = 35.$ M = 0.1 $\beta = 5.$

F—5 BASIC WITH SECTIONAL DATA, WITH FOREBODY VORTEX LIFT